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THE ANT GENUS *POLYRHACHIS* F. SMITH IN THE ETHIOPIAN REGION (HYMENOPTERA: FORMICIDAE)

B. BOLTON

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THE ANT GENUS *POLYRHACHIS* F. SMITH IN THE ETHIOPIAN REGION (HYMENOPTERA: FORMICIDAE)

By B. BOLTON

CONTENTS

	Page
SYNOPSIS	285
INTRODUCTION	285
MEASUREMENTS AND INDICES	287
MUSEUMS AND OTHER DEPOSITORIES	287
Polyrhachis F. SMITH	288
Key to species	289
The species-groups	294
The *militaris*-group	295
The *viscosa*-group	324
The *revoili*-group	331
The *monista*-group	343
The *alexisi*-group	345
The *gamaii*-group	350
SPECIES EXCLUDED	352
ACKNOWLEDGEMENTS	353
REFERENCES	353
FIGURES	356
INDEX	368

SYNOPSIS

The ant genus *Polyrhachis* F. Smith is revised for the Ethiopian region. An account of the generic and subgeneric synonymy in the region is provided and a key to the 47 presently recognised species is included. The six recognisable species-groups within the region are discussed. A complete account of the synonymy of each species and a redescription of the previously known species, based upon the worker or female caste, are provided. Nine new species are described; one new subgeneric and 44 new specific or infraspecific synonyms are established. Biological data are included where known.

INTRODUCTION

THE ant genus *Polyrhachis* contains some 700 nominal species and forms, mainly distributed throughout the Old World tropics and subtropics but with a few species extending the range of the genus northwards into central China, Korea, Japan and the countries of the Middle East. The genus is entirely absent from the New World and from the islands of Madagascar, New Zealand and the Pacific islands east of Rotuma, in the Ellice Islands.

The greatest number of species inhabit the Indo-Malayan, Oriental and Australasian regions and up to the time of the present study only some 113 nominal

species and forms were described from the Ethiopian region. Of these names a large percentage represented infraspecific taxa and in fact the number of actual species stood at 42.

Previous publications on the genus in the Ethiopian region are numerous (see references), but apart from lists of species found in different localities and descriptions of new forms, very little critical or comparative work has been accomplished since the publication by André (1887) of a key to the then-known species of the region. In this key he stated his doubts of the validity of some species and the placement of others in the regional fauna; but apart from a few obvious synonymies at the end of the last century no detailed study of the fauna of the region has been made. Santschi (1914*a*) published a key to the infraspecific forms of *P. schistacea* (Gerstaecker) and later followed this with a similar key for *P. militaris* (F.) (Santschi, 1924). The final key published by Santschi (1939) dealt with the *P. revoili* E. André complex and was the most useful aid to identification available at that time, despite the fact that it only dealt with the group as originally constructed by Emery (1925). No attempt was made to remove obviously unrelated species, nor to include related forms.

Arnold (1924) gave a key to the South African species in his monograph of the Formicidae of South Africa and included a number of good descriptions of the more common, local forms. Wheeler (1922*a*) described some new species and summarised the known biology of a number of others.

The nesting habits of the genus as a whole have been discussed by Hung (1967) who sums up by saying that four types may be recognised, as follows:

1. Arboreal: carton and silk nests amongst leaves and twigs.
2. Lignicolous: nests in the cavities of plants.
3. Terrestrial: nests on the ground under any object.
4. Subterranean: nests in the soil, without cover.

All four types are found in the Ethiopian regional fauna. Obviously, the first on the list is more or less restricted to forest species whilst the third and fourth are most commonly found in savannah forms. The second type listed above is rather a broad category and as far as the Ethiopian region is concerned includes such diverse nest sites as those of *P. decemdentata* E. André in rotten or termite-mined tree branches and those of *P. cubaensis* Mayr inside stem galls. It would probably also hold *P. otleti* Forel which nests in rot holes or crevices in tree trunks and covers the entrance with a mesh of silk and vegetable fibres. The nesting habits where known are discussed in more detail under the individual species headings, as is any other information on the biology of the species.

The distribution of the species may be divided roughly into forest and savannah forms although some may penetrate the edges of one from the other. The species *P. viscosa* F. Smith and *P. schistacea* may be considered as typical of the savannah forms, spreading throughout the continent; the former even occurs on the coastal plains of West Africa. Nests are constructed in the earth and the ants are fast-moving, ascending grasses and bushes to forage. The forest species are typified

by *P. militaris* and *P. decemdentata*, arboreal retiring forms foraging singly upon the trees and with a marked tendency to release their grip and fall into the undergrowth if disturbed.

The present study is based chiefly upon the worker caste as the females of many species are unknown. Where the female is known, notes are added under the appropriate species heading. Four species were originally described only from the female caste; three of these have been associated with workers in the present study. Associated males are extremely rare, so rare in fact as to be of no value to the present work, and they are omitted from the survey. Hung (1967) has stated that the male genitalia proved to be quite similar throughout the genus, but a detailed study will have to await the amassing of numbers of worker-associated males.

MEASUREMENTS AND INDICES

Total length (TL). The length of the entire ant measured in dorsal view with the head stretched out. In most, if not all species of *Polyrhachis* the head is carried in life with its long axis at right-angles to the long axis of the body.

Head length (HL). The length of the head in perfect full face view, measured from the middle of the anterior clypeal margin to the posteriormost point of the occipital margin.

Head width (HW). The width of the head in perfect full face view, measured immediately in front of the eyes.

Cephalic index (CI). $\frac{HW \times 100}{HL}$

Scape length (SL). The maximum length of the antennal scape, excluding the basal constriction or neck.

Scape index (SI). $\frac{SL \times 100}{HW}$

Pronotal width (PW). The width of the pronotal dorsum measured at the bases of the pronotal spines or across the humeri in species without such spines.

Metathoracic tibial length (MTL). The maximum length of the tibia of the metathoracic (hind) leg.

All measurements are expressed in millimetres.

MUSEUMS AND OTHER DEPOSITORIES

The following abbreviations are used in the text to indicate museums and other institutions.

BMNH, British Museum (Natural History), London.
CRIG, New Tafo. Cocoa Research Institute of Ghana, New Tafo.
MCSN, Genoa. Museo Civico di Storia Naturale 'Giacomo Doria', Genoa.
MCZ, Boston. Museum of Comparative Zoology, Cambridge, Mass.
MHN, Geneva. Museum d'Histoire Naturelle, Geneva.
MNHN, Paris. Museum National d'Histoire Naturelle, Paris.

MNHU, Berlin. Museum für Naturkunde der Humboldt-Universität, Berlin.
MRAC, Tervuren. Musée Royal de l'Afrique Centrale, Tervuren.
NM, Basle. Naturhistorisches Museum, Basle.
NM, Vienna. Naturhistorisches Museum, Vienna.
NMR, Bulawayo. National Museum of Rhodesia, Bulawayo.
UG, Legon. University of Ghana, Legon.

POLYRHACHIS F. Smith

Polyrhachis F. Smith, 1857 : 58. Type-species : *Formica bihamata* Drury, 1773 : 73, pl. 38, figs 7, 8, worker; by original designation.

Hoplomyrmus Gerstaecker, 1858 : 262. Type-species : *Hoplomyrmus schistaceus* Gerstaecker, loc. cit., worker; by monotypy. [Synonymy by Mayr, 1863 : 446.]

Subgenus *MYRMA* Billberg

Myrma Billberg, 1820 : 104. Type-species : *Formica militaris* Fabricius, 1781 : 493, worker; by designation of Wheeler, 1911.

Pseudocyrtomyrma Emery, 1921 : 18 [as a subgenus of *Polyrhachis*]. Type-species : *Polyrhachis revoili* E. André, 1887 : 285, female; by original designation. **Syn. n.**

GENERIC DIAGNOSIS. *Worker.* Monomorphic, medium to large (4·4 to 14·1 mm) ants belonging to the formicine tribe Camponotini.

Antennae 12-segmented, the scapes inserted some distance behind the posterior clypeal margin (usually a distance greater than the basal width of the scape). Palp formula 6,4; mandibles usually with five, rarely with four teeth. Eyes well developed. Pronotum armed with a pair of spines, teeth or tubercles in all species of the Ethiopian region, the propodeum usually armed with two spines, teeth or tubercles, or a pair of ridges, rarely with only a single transverse ridge or completely unarmed. Promesonotal suture usually present (absent from *khepra*), the development of the metanotal groove variable. Mesoscutellum very rarely present. In the single species in which the mesoscutellum occurs on the dorsum of the alitrunk, it is not separated from the scutum by a deep impression. Margination of the alitrunk variable, often present and complete but showing all stages through to a fully immarginate condition. Petiole usually with four but occasionally with two or six spines or teeth of variable configuration. Gaster large, globose, the first tergite extensive, usually forming at least half of the dorsal surface. The anterior face of the first gastral tergite is often truncated or concave. Acidopore not borne upon a conical projection of the hypopygium, usually concealed by the pygidium when not in use.

Female. As worker but with the alitrunk massively developed and with a corresponding reduction in armament and margination. The petiolar spines tend to be reduced and are usually smaller than those of the associated worker. Ocelli are present and wing venation is of the usual camponotine form.

Male. Very poorly known, in most cases indistinguishable from the males of *Camponotus*.

GENERIC AND SUBGENERIC SYNONYMY. Smith (1857) erected the genus *Polyrhachis* to include some twenty species and designated *Formica bihamata* Drury as the type-species. The following year Gerstaecker (1858) formed the monotypic genus *Hoplomyrmus* with the type-species *schistaceus* Gerstaecker for a large species from the Ethiopian region. These two type-species were recognised as being congeneric and *Hoplomyrmus* was later synonymised with *Polyrhachis*.

It has been known for some time that *Polyrhachis* is actually a junior synonym of *Myrma* Billberg. However, as the original publication of the name *Myrma* was in a rather obscure volume, it was overlooked for some time. Since its rediscovery all authorities have treated *Myrma* as a subgenus of *Polyrhachis* with the exception of Wheeler (1911), who considered that *Myrma* should be used in place of the more popular and well-known name. This claim was rejected by other workers of the period and by 1922 Wheeler was again using *Myrma* as a subgenus.

Hung (1967 : 396–398) has discussed in detail the validity of the name *Polyrhachis* in the light of the above facts and has concluded that *Myrma* is the valid name for the genus, but he asks that *Polyrhachis* be retained as it is the name in common use and as its replacement would 'cause nomenclatorial chaos'. The present author is in agreement with Hung's findings and recommendations.

Up to the time of the present study two subgenera were known from the Ethiopian region, namely *Myrma* and *Pseudocyrtomyrma* Emery. The latter group was not well defined at its inception and the present study has shown, as discussed below under the *revoili* species-group, that *Pseudocyrtomyrma* is not separable from *Myrma*. The statement of synonymy on p. 288 is therefore in order as regards the genus *Polyrhachis* in the Ethiopian region.

Key to species

(Based on worker caste)

1 Clypeus with a shallow, rectangular lobe flanked by a pair of denticles or teeth. Eyes situated well up on the head, usually not breaking the outline of the sides in full-face view. Alitrunk broad and foreshortened, with a swollen appearance in dorsal view, usually not more than 1·1 times longer than broad. Pronotum always marginate, at least for part of its length, but either the mesonotum or propodeum or both not marginate. Propodeum unarmed, the declivity extremely deep (Text-figs 60, 61) 2

– Clypeus either arcuate and entire or with a truncated median lobe. Eyes breaking the outline of the sides of the head in full-face view except when the eyes are flat. Alitrunk without a foreshortened and swollen appearance in dorsal view, usually more than 1·3 times longer than broad. Alitrunk usually either marginate or totally without lateral margination throughout its length; if partially marginate then the propodeum is armed with spines, teeth, tubercles or raised ridges . . 6

2 Petiole armed with two spines or teeth 3

– Petiole armed with four spines or teeth 4

3 Propodeum without a posterior transverse margination separating the dorsum from the declivity. Petiole dorsolaterally with two long spines, curved backwards and somewhat outwards at their apices, so that the whole petiole is lyre-shaped (Text-fig. 25). (West and Central Africa) . . . . . ***curta*** (p. 346)

– Propodeum with a weak posterior transverse margination separating the dorsum from the declivity. Petiole laterally with a pair of small triangular teeth (Text-fig. 48) (Ghana) . . . . . ***lestoni*** (p. 349)

4 Propodeum marginate laterally and posteriorly, so that the dorsum is separated from the sides and declivity 5

– Propodeum not at all marginate, so that the dorsum rounds into the sides and declivity without interruption. (Congo (Kinshasa)) . . . . ***alexisi*** (p. 346)

5 In dorsal view the sides of the propodeum projecting strongly beyond the lateral marginations so that the total width of the propodeum is notably greater than the width between the marginations. Sides of head in front of eyes concave in full-face view (Text-fig. 60) (Ghana) . . . . . ***latharis*** (p. 348)

– In dorsal view the sides of the propodeum hardly projecting beyond the lateral marginations so that the total width of the propodeum is bounded, at least posteriorly by the marginations. Sides of head in front of eyes straight in full-face view. (Congo (Kinshasa)) . . . . . ***limitis*** (p. 350)

6 Pronotum not at all marginate, the dorsum curving smoothly and without interruption into the sides 7

– Pronotum marginate at least for part of its length, usually throughout its entire length. Margination present as a raised or projecting flange, a ridge, or an acute angle separating the dorsum from the sides 16

7 Eyes flat and somewhat sunk into the surface of the head. (Cameroun) ***platyomma*** (p. 337)

– Eyes convex, not sunk into the surface of the head 8

8 Metanotal groove broad and deeply impressed. Propodeum armed with a pair of long upcurved spines, as long as or longer than those of the pronotum. Petiole with four long, back-curved spines. Dorsum of alitrunk with numerous stout, usually yellow hairs 9

– Metanotal groove weakly developed or absent, never broad nor impressed, usually only represented by a line breaking the sculpturation. Propodeum unarmed or with a pair of tubercles, teeth or ridges which are notably smaller than those of the pronotum. Petiole with a dorsal pair of spines and a lateral pair of teeth or shorter spines. Hairs on dorsum of alitrunk fine or absent 10

9 Promesonotal suture broad and deeply impressed. Propodeum without a median tuberculiform prominence between the spines (Text-fig. 18). (West and Central Africa, Uganda) . . . . . ***monista*** (p. 343)

– Promesonotal suture narrow, not impressed. Propodeum with a median tuberculiform prominence between the spines (Text-fig. 19). (Ghana and Congo (Kinshasa)). . . . . ***spitteleri*** (p. 344)

10 Antennal scapes or dorsum of alitrunk or both with erect hairs. Mesoscutellum not visible on dorsum of alitrunk 11

– Antennal scapes and dorsum of alitrunk without erect hairs. Mesoscutellum present on dorsum of alitrunk. (South Africa : Natal) . . ***gamati*** (p. 351)

11 Pronotal dorsum sculptured, armed with a pair of distinct spines 12

– Pronotal dorsum smooth and polished, unsculptured apart from pits from which hairs arise, armed with a pair of small or minute teeth or tubercles 15

12 Propodeum armed posteriorly with a pair of transverse ridges separating the dorsum from the declivity; the ridges not meeting medially (Text-fig. 17) 13

– Propodeum armed posteriorly with a pair of short, upcurved teeth, between which the dorsum curves into the declivity 14

13 Median portion of clypeus projecting anteriorly as a truncated rectangular lobe. Relatively more slender species, CI 73, HW 1·00, PW 0·89. (Congo (Kinshasa)) ***volkarti*** (p. 341)

– Median portion of clypeus arcuate and entire, not projecting as a truncated rectangular lobe. Relatively more stout species. CI > 75, HW > 1·20, PW > 1·00. (Cameroun, Congo (Brazzaville)) . . . . . ***lanuginosa*** (p. 335)

14 More than 30 erect hairs on each antennal scape. Dorsal surfaces of mesonotum and propodeum with a disorganised rugulation or a rugoreticulum; pubescence masking alitrunk sculpturation at least in part. Larger (TL 6·1 or more), relatively more thickset (PW 1·40 or more) species. (East and South Africa) ***revoili*** (p. 338)

– Less than 10 erect hairs (usually none) on each antennal scape. Dorsal surfaces of mesonotum and propodeum sharply longitudinally rugose; pubescence not masking alitrunk sculpturation. Smaller (TL 6·1 or less), relatively more slender (PW 1·26 or less) species. (West and Central Africa) . . . . ***weissi*** (p. 342)

15 Head unsculptured, with a short, longitudinal groove terminating in a pit-like depression posteriorly; this structure situated close to the external margin of the antennal insertion (Text-fig. 56). Sutures of alitrunk present on dorsum but poorly developed. (Ghana) . . . . . ***braxa*** (p. 333)

– Head sculptured, without a groove and pit as described above. Dorsum of alitrunk without sutures. (Ghana) . . . . . ***khepra*** (p. 334)

16 Metanotal groove represented only by a line or an indistinct scoring across the dorsum of the alitrunk which may fail to break the sculpturation; metanotal groove never impressed, sometimes completely absent (Text-figs 12–16) . . . 17

– Metanotal groove distinct, broad and always impressed; in profile often with the appearance of a V or U-shaped trench separating the mesonotum from the propodeum (Text-figs 10, 11) 26

17 Antennal scapes with numerous erect hairs standing out at right-angles to the long axis of the shaft 18

– Antennal scapes without erect hairs standing out at right angles to the shaft. (A few at the extreme apex may be present, projecting in the same direction as the long axis of the scape) 20

18 Propodeum with a pair of transverse ridges separating the dorsum from the declivity, the ridges fail to meet medially and a small but distinct gap is present (Text-fig. 16). (West and Central Africa) . . . . . ***otleti*** (p. 336)

– Propodeum with a pair of teeth or minute tubercles, between which the dorsum curves into the declivity over its entire width 19

19 Sculpturation of head in space between eye and frontal carina regularly, finely longitudinally striate-rugose. Dorsum of mesonotum separated from sides by an obtuse angle (Text-figs 47, 59). Larger species, TL 7·0 mm or more, HL > 1·50, PW 1·00 mm. (Uganda) . . . . . ***transiens*** (p. 340)

– Sculpturation of head in space between eye and frontal carina an irregular rugo-reticulum, the spaces between which are finely reticulate-punctate. Dorsum of mesonotum rounding into sides without interruption (Text-figs 52, 58). Smaller species, TL < 5·0, HL < 1·30, PW < 1·00. (Ghana) . . . . . ***regesa*** (p. 337)

20 Propodeum not marginate laterally; pronotum very weakly marginate for about half its length. Sculpturation everywhere a fine superficial reticulation or reticulate-puncturation. (Cameroun) . . . . . ***aenescens*** (p. 332)

– Propodeum marginate laterally; pronotum marginate throughout its length. Sculpturation of alitrunk basically a fine reticulate-puncturation overlaid by longitudinal rugae or a loose rugoreticulum 21

21 Propodeum with a transverse raised ridge running between the spines or teeth and separating the dorsum from the declivity (Text-fig. 13), the ridge often raised into a tooth or tubercle medially 22

– Propodeum without a transverse raised ridge running between the spines or teeth, the dorsum passing through an angle or curving directly into the declivity. Median tooth or tubercle always absent 25

22 Gaster finely longitudinally striate. (South Africa, Malawi) . . ***arnoldi*** (p. 324)

– Gaster finely reticulate-punctate 23

23 Apex of antennal scape suddenly broadened, hood-like in dorsal view, concealing the base of the first funicular segment which is strongly dorsoventrally flattened basally (Text-fig. 22). Eyes usually quite flat, occasionally weakly convex. (Savannah regions throughout Africa) . . . . . ***viscosa*** (p. 330)

– Apex of antennal scape not suddenly broadened, not hood-like nor concealing the base of the first funicular segment, this segment not dorsoventrally flattened basally. Eyes convex 24

24 Propodeum with only a transverse ridge running between the spines; the ridge may be arched medially but no tooth or tubercle is present. Propodeal spines outcurved directed posterolaterally, only very slightly upcurved. (South and East Africa) . . . . . ***spinicola*** (p. 329)

– Propodeum with a transverse ridge running between the spines which is raised medially into a tooth or tubercle. Propodeal spines directed upwards and upcurved. (South Africa, Mozambique, Tanzania) . . . ***cubaensis*** (p. 325)

25 Petiole with a single pair of well-developed spines situated at the dorsolateral corners. On the dorsal margin between these spines are a pair of small teeth or tubercles (Text-fig. 40). (Ghana, Uganda, Congo (Kinshasa)) . . ***nigrita*** (p. 328)

– Petiole with two pairs of well-developed spines; the dorsal pair somewhat longer than the lateral (Text-fig. 30). (South Africa : Natal) . . ***durbanensis*** (p. 327)

26 Petiole with two spines 27

– Petiole with four or six spines or teeth 28

27 Petiolar spines subparallel, strongly hooked backwards at their apices (Text-fig. 24). Clypeus carinate; gastral pubescence usually golden. (West and Central Africa, Uganda, Angola) . . . . . ***laboriosa*** (p. 308)

– Petiolar spines divergent, curving posteriorly along their length but not hooked apically (Text-fig. 23). Clypeus not carinate; gastral pubescence not golden, usually grey. (Congo (Kinshasa), Angola) . . . . ***wellmani*** (p. 328)

28 Petiole with six spines or teeth, the smallest pair situated behind the lateral pair of spines. (West and Central Africa) . . . . ***decemdentata**** (p. 302)

– Petiole with four spines or teeth of variable configuration 29

29 Pronotal dorsum without erect hairs 30

– Pronotal dorsum with erect hairs 36

30 Dorsum of head with a pair of erect hairs situated on a level with the posterior margins of the eyes. If the hairs have been lost, then the site of their original insertion is marked by a pair of distinct pits 31

– Dorsum of head without erect hairs; no hairs nor pits marking the former insertions of hairs present on the dorsum on a level with the posterior margins of the eyes 32

31 Anterior clypeal margin with a small, shallow impression or notch medially. In dorsal view the propodeal marginations somewhat convex in outline and gradually diverging posteriorly to the propodeal teeth. Antennal scapes relatively extremely long (SI 181). (Ghana) . . . . . ***decellei*** (p. 301)

– Anterior clypeal margin arcuate and entire, without a shallow median impression. In dorsal view the propodeal marginations convex in outline, broadest at about the midlength of the segment and converging anteriorly to the metanotal groove and posteriorly to the propodeal tooth. Antennal scapes relatively much shorter (SI 159). (Ghana) . . . . . ***esarata*** (p. 303)

32 Head, body and appendages covered with a very dense, silvery pubescence. Pronotal spines long, in lateral view directed downwards and forwards, somewhat downcurved. Large species, HL > 2·00, HW > 1·55. (South and East Africa) ***schlueteri*** (p. 321)

– Head, body and appendages usually with sparse pubescence; if dense then the pubescence is not silvery in colour. Pronotal spines long or short, but in lateral view not directed downwards and forwards, nor downcurved. Smaller species. HL < 2·00, HW < 1·45 33

* The worker of *andrei* would be expected to run out at this point.

33 In posterior view the side of the head at the ventral margin of the eye projecting laterally below the eye and forming a shield or blinder. In side view the ventral margin appearing concave, so that the eye is reniform (Text-fig. 2). In full-face view, sides of head in front of eyes noticeably concave. Larger species with relatively long antennae. HL 1·85 or more, SI > 170. (West and Central Africa) . . . . . ***concava*** (p. 299)

– In posterior view the side of the head at the ventral margin of the eye not projecting below the eye. In side view the ventral margin convex to shallowly concave. In full-face view, sides of head in front of the eyes varying from more or less straight to convex. Smaller species with relatively short antennae, HL < 1·80, SI < 155 34

34 Dorsum of pronotum strongly transversely concave, the lateral marginations projecting as raised flanges. (Congo (Kinshasa)) . . . . ***aerope*** (p. 296)

– Dorsum of pronotum very shallowly concave to transversely convex, the lateral marginations not projecting as raised flanges 35

35 Sculpturation of head a fine, dense, reticulate-puncturation. On the sides of the head below and in front of the eye, and on the gena between the eye and the posterior clypeal margin with numerous more distinct pits, usually arranged in groups of three or four. Larger species, HL > 1·60. (West and Central Africa) ***alluaudi*** (p. 297)

– Sculpturation of head a fine, dense, reticulation; the sides of the head below and in front of the eye, and the gena between the eye and the posterior clypeal margin with the same sculpturation as the dorsum. Smaller species, HL < 1·30. (West and Central Africa) . . . . . ***rufipalpis*** (p. 317)

36 Lateral pair of petiolar spines as long as, or longer than the dorsals 37

– Lateral pair of petiolar spines short, always notably shorter than the dorsals, may be reduced to a pair of acute teeth 41

37 Antennal scapes with numerous erect hairs projecting from the shaft. (Ghana) ***asomaningi*** (p. 298)

– Antennal scapes without erect hairs projecting from the shaft 38

38 First gastral tergite finely longitudinally striate-rugose, with numerous small punctures between the rugae. ('Equatorial Africa') . . ***phidias*** (p. 316)

First gastral tergite finely superficially reticulate or reticulate-punctate 39

39 Lateral pair of petiolar spines enormously developed, many times larger than the dorsals, which are reduced to a pair of short spines (Text-fig. 41). (Congo (Kinshasa)) . . . . . ***cornuta*** (p. 300)

– Lateral pair of petiolar spines not greatly developed; the dorsals as long as, or only a little shorter than the laterals 40

40 Face with a short, longitudinal, shallow groove terminating in a depression posteriorly; situated close to the outer margin of the antennal socket. Dorsum of propodeum extremely finely and densely longitudinally striate. (West and Central Africa, Uganda) . . . . . ***lauta*** (p. 311)

– Face without a short, longitudinal, shallow groove terminating in a depression posteriorly. Dorsum of propodeum coarsely and distinctly, transversely striate. (West and Central Africa, Uganda) . . . . . ***fissa*** (p. 304)

41 Propodeum not marginate. Entire body very deeply and regularly striate, the spaces between the striae strongly convex, giving a ploughed appearance. This sculpturation V-shaped on the propodeum, longitudinal on head and rest of dorsal alitrunk (Text-fig. 62). (Ghana, Congo (Brazzaville)) . . . ***sulcata*** (p. 322)

– Propodeum marginate. Sculpturation not as above; if striate then finely so, not V-shaped on propodeum 42

42 Dorsum of propodeum separated from decliivty by a strongly arched transverse, raised ridge running between the spines. First gastral tergite reticulate-punctate, overlaid on the basal half by a fine, dense, longitudinal rugulation. (Central Africa) ***latispina*** (p. 309)

– Dorsum of propodeum not separated from declivity by a transverse ridge, the two surfaces confluent. First gastral tergite usually reticulate or reticulate-punctate, more rarely rugose 43

43 Dorsum of alitrunk with erect hairs present only on the pronotum. Side of head between ventral border of eye and ventrolateral margin without erect hairs. Gaster highly polished, with a very fine, superficial reticulation. (South and East Africa) . . . . . ***gagates*** (p. 305)

– Dorsum of alitrunk with erect hairs present on all segments. Side of head between ventral border of eye and ventrolateral margin with erect hairs. Gaster usually dull, with a fine reticulate-punctate sculpturation, or sculpturation hidden by pubescence 44

44 Pubescence abundant everywhere, hiding the sculpturation of the dorsal alitrunk and gaster, at least in part; often silvery or golden in colour on part or all of the body. Relatively broader, more thickset species, HW > 2·3, CI > 82, PW > 2·0 45

– Pubescence sparse, not hiding the sculpturation of the alitrunk or gaster, usually greyish in colour. Relatively narrower, more slender species, HW < 2·3, CI 80 or less, PW < 2·0. (Savannah regions throughout Africa) . . ***schistacea*** (p. 318)

45 Lateral margination of alitrunk, especially pronotum, usually extended as a raised flange; the alitrunk somewhat concave dorsally between the marginations. Pubescence usually with a golden, brassy or bronze tinge on the alitrunk, gaster, or both. Erect hairs usually yellowish, not sinuate. Head with longitudinal rugulations which are also visible on the pronotal dorsum, especially at the bases of the spines. Eyes convex. (Forest regions throughout Africa) ***militaris*** (p. 313)

– Lateral margination of alitrunk not extended as a raised flange, the alitrunk flat to weakly convex dorsally. Pubescence long, everywhere with a silvery tinge. Erect hairs abundant, silver-grey, sinuate or curved. Sculpturation everywhere, beneath the pubescence, of a fine, superficial reticulation. Eyes flat to weakly convex. (East Africa) . . . . . ***medusa*** (p. 312)

THE SPECIES-GROUPS

The 47 recognised species of *Polyrhachis* in the Ethiopian region can be divided into six groups of species, most of which are intergradient, on morphological grounds. The groupings are as follows:

The *militaris*-group; including the species *aerope* Wheeler, *alluaudi* Emery, *andrei* Emery, *asomaningi* sp.n., *concava* E. André, *cornuta* Stitz, *decellei* sp.n., *decemdentata* E. André, *esarata* sp.n., *fissa* Mayr, *gagates* F. Smith, *laboriosa* F. Smith, *latispina* Emery, *lauta* Santschi, *medusa* Forel, *militaris* (F.), *phidias* Forel, *rufipalpis* Santschi, *schistacea* (Gerstaecker), *schlueteri* Forel, *sulcata* E. André, *wellmani* Forel.

The *viscosa*-group; including *arnoldi* Forel, *cubaensis* Mayr, *durbanensis* Forel, *nigrita* Mayr, *spinicola* Forel, *viscosa* F. Smith.

The *revoili*-group; including *aenescens* Stitz, *braxa* sp.n., *khepra* sp.n., *lanuginosa* Santschi, *otleti* Forel, *platyomma* Emery, *regesa* sp.n., *revoili* E. André, *transiens* sp.n., *volkarti* Forel, *weissi* Santschi.

The *monista*-group; including *monista* Santschi and *spitteleri* Forel.
The *alexisi*-group; including *alexisi* Forel, *curta* E. André, *latharis* sp.n., *lestoni* sp.n., *limitis* Santschi.
The *gamaii*-group; including the single species *gamaii* Santschi.

THE *MILITARIS*-GROUP

The group is characterised by the complete margination of the pronotum, mesonotum and in all but one species (*sulcata*) the propodeum, and the markedly impressed metanotal groove. The margination of the alitrunk is interrupted at the sutures. The majority of species have an unmodified, arcuate clypeal margin and have retained the armament of the propodeum as a pair of upcurved teeth or spines, which in some species are reduced to mere tubercles, but only very rarely are they completely lost. Sculpturation in the group consists usually of a fine, superficial reticulation or a regular striation or striate-rugulation. Sculpturing of the form found in the *viscosa*-group, of a fine dense reticulate-puncturation overlaid by a rugoreticulum is very rare, but numerous species have the gaster reticulate-punctate.

Within the group the species tend to polarise into one of three complexes, centring on *fissa*, *concava* and *militaris* respectively. The species allied to *fissa* tend to be shorter, more stoutly built forms with a stronger sculpturation, usually of longitudinal striae or rugae. The pronotal spines tend to be short, flattened and broadly triangular in dorsal view whilst the petiolar armament shows all spines of approximately equal length or with the lateral pair developed at the expense of the dorsals. In the series *fissa*—→*asomaningi*—→*decemdentata*—→*phidias*—→*cornuta* there is a gradual reduction in the length of the dorsal pair of spines, and a gradual increase in the length and thickness of the laterals, until in *cornuta* the dorsals are reduced to a pair of very short spines. This series appears to parallel the condition found in part of the *viscosa*-group. All species closely related to *fissa* have numerous erect hairs on the dorsum of the head and alitrunk, but these may be absent from the appendages.

The species most closely related to *concava* tend to be more slender and elongate forms, of small to medium size and with a fine sculpturation. This is usually a superficial reticulation but in some is a fine and dense reticulate-puncturation. Erect hairs are usually only present on the anterior clypeal margin and the apex of the gaster, but in some species a single pair of hairs is present on the dorsum of the head. The petiole is always armed with a pair of long dorsal spines, sometimes very long and recurved over the base of the first gastral tergite, and a pair of smaller spines or teeth laterally.

The allies of *militaris* are large species, often 10 mm or more in total length. General build of the body varies but the majority are stocky, rather broad species. Sculpturation varies from striate to a very fine superficial reticulation, but all species

are clothed with erect hairs on the head, appendages, gaster and at least part of the dorsal alitrunk. The petiole is armed with a pair of long dorsal spines and a shorter pair of lateral spines or teeth. In some species the laterals have been completely lost. The sequence *latispina*——→*sulcata*——→*gagates*——→*wellmani* shows the gradual reduction of the lateral spines to teeth and finally, in *wellmani*, their disappearance.

Species of the *militaris* group are distributed throughout Africa, but those related to *fissa* and *concava* are mostly confined to forested regions. The group appears to be the basic stock, from which members of the remaining groups have developed by reduction of the characters listed above. The only exception to this assumption is the *gamaii* group which seems quite unrelated.

Polyrhachis aerope Wheeler

Polyrhachis aerope Wheeler, 1922*a* : 265, figs 72 c, d. Holotype worker, CONGO (KINSHASA): Niangara (*Lang* and *Chapin*) (depository unknown).

I have not been able to see the unique worker of this species, but the original description and figures are good enough to delimit the species. The description is reproduced below in a somewhat amended condition, to fit in with the format used for other species in the survey.

Worker. TL 'somewhat less than 6 mm'. CI approx. 74, SI approx. 147 (approximated from Wheeler, 1922*a*, fig. 72c).

Anterior clypeal margin arcuate, entire. Eyes convex, prominent. The sides of the head in front of the eyes shallowly convex. Behind the eyes the sides round into the very convex occipital margin. Alitrunk marginate throughout its length, the margination interrupted at the sutures. Dorsal surface of alitrunk concave, with strong, upturned margins. Pronotum armed with a pair of long, acute spines; propodeum with a pair of small, slightly recurved teeth. Promesonotal suture distinct; metanotal groove developed, impressed. In dorsal view the lateral margins of the pro- and mesonota converging posteriorly, almost parallel on the propodeum. Petiole with a pair of long dorsal spines and a laterally placed pair of teeth.

Erect hairs absent from dorsal surfaces of head and body; pubescence short and sparse, visible only on sides of alitrunk, clypeus and appendages.

Gaster very minutely and superficially punctate; head, thorax and petiole finely coriaceous or shagreened. Colour black, the palpi and antennal insertions reddish.

As Wheeler (1922*a* : 266) points out, this species is very closely related to *concava*. The two species may be separated by the larger size of *concava* (TL 6·8 or more), the different shape of the sides of the head, and the notably greater SI of 172 or more. Besides these characters, Wheeler makes no mention of any modification of the ventral margin of the eye, a feature typical of *concava*; but if the eye of *aerope* is modified as in *concava* then the synonymy of the two species will have to be considered.

The single specimen from which the species was described was recovered from the stomach of a frog.

Polyrhachis alluaudi Emery

(Text-figs 3, 10, 38)

Polyrhachis alluaudi Emery, 1891 : 567, pl. 15, figs 9, 10. Holotype worker, IVORY COAST : Assinie (*Ch. Alluaud*) (MCSN, Genoa) [examined].

Polyrhachis alluaudi var. *anteplana* Forel, 1916 : 448, Holotype worker, CONGO (KINSHASA) (*H. Kohl*) (MHN, Geneva) [examined]. **Syn. n.**

Worker. TL 6·7–7·1, HL 1·67–1·78, HW 1·26–1·37, CI 75–77, SL 1·81–2·03, SI 143–148, PW 1·15–2·03, MTL 1·92–2·08. (4 measured.)

Anterior clypeal margin convex, arcuate, entire except for a few median notches marking the sites of insertion of the marginal clypeal hairs. In profile the clypeal outline sinuate, broadly and shallowly S-shaped. Eyes convex, the sides of the head in front of the eyes elongate, straight to weakly concave and somewhat convergent anteriorly. Alitrunk marginate throughout its length, interrupted at the sutures. Pronotum flat to shallowly transversely concave, armed with a pair of short spines. Mesonotum flat to shallowly concave. Propodeum armed with a pair of upcurved teeth, the dorsal surface concave, especially behind the metanotal groove. Sutures well developed on dorsum of alitrunk; the promesonotal incised, the metanotal groove deeply impressed. Petiole with four spines, the dorsal notably longer than the lateral pair.

Erect hairs present only on the anterior clypeal margin and the gastral apex. An extremely sparse and fine pubescence present, most easily seen on the sides of the alitrunk.

Sculpture everywhere of a fine, dense reticulate-punctuation, the sides of the head, especially below and in front of the eyes with numerous coarser punctures.

Female, as worker, with the usual differences associated with the caste.

The holotype worker of *alluaudi* is very damaged and mounted upon a card in several pieces, along with pieces of a female (head and wings), and a few parts of a second worker (part of alitrunk, one eye, a fragment of head capsule, petiole), as mentioned by Emery in the original description. The head of the holotype is crushed and the alitrunk mounted upside-down. For this reason the measurements given above apply to the holotype of *anteplana* and the other material examined. However, enough of the type specimens remained to make a comparison with *anteplana*, which was found to be a synonym, differing from *alluaudi* only in the slightly more concave propodeum and (apparently) somewhat larger size.

The species belongs to the *militaris* group and appears to be closest related to *rufipalpis*, from which it differs in size (larger) and in possessing distinct, scattered punctures on the sides of the head. These punctures may occur singly but are usually in closely approximated groups of three or four.

The nest of the species was described and figured in the original description and was reproduced by Wheeler (1922*a* : 267, fig. 74). Emery stated that the nest was constructed of rather coarse vegetable fibres loosely glued together and attached to the underside of a leaf about 1·7 m above the ground. The nest appeared as a low-vaulted chamber with the entrance situated at the apex of a funnel-like extrusion arising from near the centre of the nest.

Wheeler (1922*a* : 266) states that a single worker of the species was found in the stomach of a frog.

MATERIAL EXAMINED.

CONGO (KINSHASA) : Stanleyville (*A. Collart*).

Also reported from Ivory Coast (type data).

Polyrhachis andrei Emery

Polyrhachis andrei Emery, 1921 : 22, figs 1a, b, c. Holotype ♀, CAMEROUN (*L. Conradt*) (probably in MCSN, Genoa).

This species is known only from the female and only from the type collection. Emery gives TL 7–8, HL 1·8, HW 1·6 (width measured behind the eyes).

On the whole the species is very closely related to, and may in fact prove to be inseparable from *decemdentata*. The following comparisons will separate the females of the two species:

andrei	*decemdentata*
Eyes in front of midlength of head.	Eyes behind midlength of head.
Posterior pair of petiolar teeth spiniform, as long as dorsolateral pair.	Posterior pair of petiolar teeth dentiform, notably smaller than dorsolateral pair.
Virtually no pubescence except on legs.	Pubescence sparse but distinct everywhere.

It will not be possible to decide the true status of *andrei* until large series of *decemdentata* females have been studied and an investigation of the variability of the characters mentioned above has been made, or until *andrei* workers are found.

From the specimens of *decemdentata* seen by the present author the situation seems to call for the retention of *andrei* as a good species.

Polyrhachis asomaningi sp. n.

(Text-figs 44, 53)

Holotype worker. TL 5·9, HL 1·29, HW 1·07, CI 80, SL 1·40, SI 130, PW 1·22, MTL 1·37.

Mandibles with five teeth; the anterior clypeal margin with a small, shallow median concavity. Eyes strongly convex, the sides of the head in front of the eyes shallowly convex and converging anteriorly. Behind the eyes the sides form a blunt angle with the shallowly convex occipital margin. Pronotum and mesonotum strongly marginate laterally, the propodeum more weakly so; the margination interrupted at the sutures. Pronotum armed with a pair of broad, flat, triangular spines whose outer edges form a continuous convexity with the lateral marginations of the segment, which incurve strongly to the promesonotal suture. In dorsal view the lateral marginations of the mesonotum are convexly arcuate, those of the propodeum about parallel. Pronotum and mesonotum gently transversely convex dorsally, the propodeum more sharply so, armed posteriorly with a pair of small upcurved spines. Declivity of propodeum strongly concave. Promesonotal suture distinct, weakly arched; metanotal groove broad and deeply impressed. Petiole armed with two pairs of spines, the dorsal pair somewhat shorter than the laterals which are directed outwards and weakly upwards and backwards. Anterior face of first gastral segment concave, to receive the convex posterior surface of the petiole.

Head, dorsal surfaces of body and the appendages with abundant long, off-white, erect hairs. Pubescence long, greyish, very sparse.

Clypeus very finely reticulate-rugose, more coarse on the sides of the median portion than on the centre. Sides of head reticulate-rugose, the dorsum longitudinally rugose with only a few transverse rugae. Dorsum of pronotum as dorsum of head, the longitudinal rugae predominating except on the lateral portions where a rugoreticulum is apparent. Dorsal surfaces of mesonotum and propodeum with a disoriented rugoreticulum which is also present, though finer, on the anterior surface of the petiole. The sides of the alitrunk more finely reticulate-rugose. Propodeal declivity finely rugose, more shiny than the dorsum. Gaster coarsely and densely reticulate-punctate.

Colour black, dull, the gaster and propodeal declivity dully shining. Apical funicular segments yellowish brown.

Paratypes as holotype but with the following range of dimensions:
TL 5·4–5·9, HL 1·22–1·34, HW 1·07–1·11, CI 79–86, SL 1·37–1·45, SI 128–130, PW 1·22–1·29, MTL 1·37–1·45. (6).

Holotype worker, GHANA : Eastern Region, Mt Atewa, primary forest, by pyrethrum knock-down, sample A 12/6, 25.vii.1969 (*D. Leston*) (BMNH).

Paratype workers. GHANA : 2, Eastern Region, Mt Atewa, primary forest by pyrethrum knock-down, sample A 12/6, 25.vii.1969 (*D. Leston*) (BMNH); 2, same data as holotype but 23.vii.1969, samples A 7/3, A 7/4 (*D. Leston*) (UG, Legon; BMNH); 2, same data as holotype but 27.vii.1969, samples A 8/4, A 8/5 (*D. Leston*) BMNH).

An arboreal, forest-dwelling species closely related to *fissa* and its allies but separated from them by the presence of long, erect hairs standing out from the antennal scapes. Also characteristic of the species is the sculpturation, which is coarser and less organised than in others of the complex where it tends to form organised longitudinal or transverse rugae or striae on the entirety of the dorsal alitrunk.

Polyrhachis concava E. André

(Text-figs 1, 2, 33)

Polyrhachis concava E. André, 1889 : 218. Holotype worker, SIERRA LEONE (MNHN, Paris).

Worker. TL 6·8–7·6, HL 1·85–1·92, HW 1·29–1·37, CI 69–74, SL 2·29–2·40, SI 172–180, PW 1·00–1·18, MTL 2·37–2·55. (28 measured.)

Anterior margin of clypeus arcuate and entire. Sides of head in front of eyes shallowly but distinctly concave, slightly narrower than immediately behind the eyes. Sides of head behind the eyes rounding into the extremely convex occipital margin. Eyes in full face view appearing convex but in profile or postero-dorsal view it can be seen that the side of the head bordering the ventral margin of the eye is raised and extended to form a blinder, which appears to obscure the ventral margin of the eye, giving it a reniform outline. Dorsum of alitrunk transversely concave, the propodeum much more strongly so than the pronotum. Alitrunk marginate throughout its length, interrupted only at the sutures. The marginations of the constituent segments projecting and flange-like, more strongly so on the propodeum than on the pronotum. Pronotum armed with a pair of spines, propodeum with a pair of upcurved teeth of variable length, usually quite small but occasionally long and spine-like. Promesonotal suture distinct; metanotal groove impressed. Petiole with a pair of very long dorsal spines, divergent and curving backwards over the gaster in profile, and with a pair of short upcurved spines laterally, of variable length. Anterior face of first gastral segment vertical, not concave in the middle of the face.

Erect hairs present only on anterior clypeal margin and apex of gaster. Pubescence yellowish to pale golden in colour, densest on the alitrunk where it hides the sculpturation, less dense on the head and gaster.

Sculpturation everywhere of a fine superficial reticulation, finer on clypeus than on remainder of head.

Female as worker but on the alitrunk only the propodeum is concave between the two small, obtuse teeth found in this caste. Propodeum strongly marginate (After Forel, 1916 : 448).

The distinctive form of the eye immediately separates this species from all others of the *militaris* group in the Ethiopian region. A similar eye structure is known from some species of the Indo-Malayan region and in the subgenus *Hemioptica* Roger. André did not mention the character in his original description, nor did Wheeler (1922*a*) when comparing *concava* to *aerope*, but attention was drawn to it by Emery (1925 : 204) in his characterisation of the *abrupta* Mayr group of the subgenus *Myrma*.

Apart from the fact that the species is arboreal, nothing is known of its habits. Wheeler (1922*a* : 265) records that the species has been found in the stomachs of toads and pangolins.

MATERIAL EXAMINED.

GHANA : Tafo (*B. Bolton*); Mt Atewa (*D. Leston*). CONGO (KINSHASA) : Solon (?); Congo da Lemba (*R. Mayné*); Kunungu (*H. Schouteden*); Brabanta, Basongo (*P. Henrard*); Yangambe (*P. Henrard*); Ituri, Plaine d'Odongo (*A. Collart*); Stanleyville (*A. Collart*); Mayumbe, Kuni (*A. Collart*); Bas-Uele (*G. F. de Witte*); Pawa Region (*M. Reitter*); Uele, Dingila (*H. J. Bredo*); Ituri, Masua (*A. Collart*); Ituri, Genge, Nizi (*A. Collart*); Mayumbe (*R. P. Vanderyst*).

Also recorded from Sierra Leone (type data), Cameroun, Gabon, and Congo (Brazzaville).

Polyrhachis cornuta Stitz

(Text-figs 9, 41)

Polyrhachis cornuta Stitz, 1910 : 150. Holotype worker, CONGO (KINSHASA) : Kuako, Kimpoko (*Buttner*) (MNHU, Berlin) [examined].

Worker. TL 5·6, HL 1·42, HW 1·16, CI 82, SL 1·60, SI 138, PW 1·20, MTL 1·58.

Anterior clypeal margin arcuate and entire. Eyes convex, large and prominent. Sides of head in front of eyes more or less straight, somewhat convergent anteriorly. Behind the eyes the sides of the head almost straight, meeting the shallowly convex occipital margin almost in a right-angle. The eye itself is set in a somewhat impressed area upon the side of the head. Alitrunk marginate laterally throughout its length, the marginations interrupted at the sutures. Pronotum armed with a pair of broad, flattened, subtriangular spines; the propodeum with a pair of minute teeth. Promesonotal suture well developed; metanotal groove distinct and impressed. Dorsal surfaces of the constituent sclerites of the alitrunk convex. Petiole with a pair of short erect dorsal spines and an enormously developed pair of lateral horns which curve upwards, outwards and backwards around the base of the first gastral segment. These lateral spines are extremely thick at the base and taper apically. Anterior face of the first gastral segment concave medially.

All dorsal surfaces of the head and body with numerous long, erect hairs, which are however absent from the antennal scapes. Pubescence very fine and sparse, greyish, densest on the sides of the alitrunk and on the gaster.

Clypeus and gaster finely and densely superficially reticulate. Head, dorsum and sides of alitrunk, and anterior face of petiole longitudinally striate-rugose, more faintly so on the petiole than elsewhere.

Black, with legs, mandibles and apical six segments of the antennal funiculus brown or yellow-brown.

As stated by Stitz in the original description the structure of the petiole in this species is its most distinguishing character. The petiole form and shape of the head ally this species very closely to *phidias*, whilst the overall build and sculpturation places the species firmly in the *fissa* complex of the *militaris*-group. Differences from *phidias* include the sculpturation and the smaller size of that species.

***Polyrhachis decellei* sp. n.**

(Text-figs 46, 54)

Holotype worker. TL 7·8, HL 1·64, HW 1·18, CI 72, SL 2·14, SI 181, PW 1·02, MTL 2·20.

Anterior clypeal margin arcuate, with a small, shallow impression medially. Head broadest in front, the sides convex in front of the eyes; the latter very convex and protuberant. Sides of head behind the eyes rounding immediately into the convex occipital margin. Dorsum of pronotum very shallowly transversely concave, almost flat; mesonotum similar but the propodeal dorsum shallowly convex medially. Alitrunk marginate on each side throughout its length, the margination interrupted at the sutures. Pronotum armed with a pair of long, acute spines, the outer edges of which are continuous with the pronotal marginations. Propodeum with a pair of small but acute teeth. Promesonotal suture distinct; metanotal groove well developed and impressed. In side view the propodeal margin arises almost vertically from the metanotal groove, passes through a convex curve and then slopes quite steeply backwards to the propodeal teeth. In dorsal view the marginations of the pronotum and mesonotum converge posteriorly whilst those of the propodeum are slightly convex in outline and gradually diverge posteriorly. Petiole armed with a pair of long dorsal spines, divergent and recurving dorsally over the base of the first gastral segment. Lateral armament of petiole a pair of short, triangular, acute teeth. Anterior face of first gastral segment not concave medially.

Erect hairs present only on the anterior clypeal margin and the gastral apex, and with a single pair of hairs arising from the dorsum of the head, on a level with the posterior borders of the eyes. In the holotype the left hair of the pair is missing but the pit showing the former site of its insertion is distinct. Pubescence quite dense on the alitrunk, with a weak golden or yellowish tinge dorsally, more greyish in colour on the sides. Gastral pubescence exceedingly fine, short and sparse.

Entire body, including head, finely and densely reticulate, dully shining. Colour black, the legs a very dark brown-black.

Paratype worker as holotype, somewhat smaller; TL 7·4, HL 1·60, HW 1·16, CI 72, SL 2·10, SI 181, PW 1·02, MTL 2·12. Pubescence of alitrunk rather more dense and golden than in the holotype; the propodeal teeth slightly more pronounced.

Holotype worker, GHANA : Eastern Region, Begoro, 10.vi.1968 (*C. A. Collingwood*) (BMNH).

Paratype worker, GHANA : Eastern Region, Bunso, 7.vii.1969 (*D. Leston*) (UG, Legon).

This medium-sized, forest zone species is closely related to *concava* and its immediate allies, rather more distantly so to *alluaudi* and the smaller species similar to it. The nearest related species is *esarata*, from which it may be separated by the shape of the eye, the construction of the petiole, the outline of the propodeal marginations and the shape of the anterior clypeal margin. With *esarata* the present species shares a single character not found in any other member of the complex of species centring on *concava*, namely the presence of a pair of erect hairs upon the dorsum of the head.

Polyrhachis decemdentata E. André

Polyrhachis decemdentata E. André, 1889: 219. Holotype worker, SIERRA LEONE (MNHN, Paris).
Polyrhachis decemdentata var. *fernandensis* Forel, 1901*a* : 377. Holotype worker, EQUATORIAL GUINEA : Fernando Po (probably in MHN, Geneva). **Syn. n.**
Polyrhachis decemdentata var. *flavipes* Stitz, 1910 : 149. Syntype workers and ♀♀, CAMEROUN : Victoria (*Buchholz*) (probably in MNHU, Berlin). **Syn. n.**
Polyrhachis decemdentata var. *gustavi* Emery, 1921 : 22. Syntype ♀♀, EQUATORIAL GUINEA : Fernando Po (probably in MCSN, Genoa). **Syn. n.**
Polyrhachis decemdentata subsp. *tenuistriata* Menozzi, 1932 : 114. Syntype workers, UGANDA : Bugala (*E. Bayon*) (probably in Istituto di Entomologia, Bologna). **Syn. n.**

Worker. TL 4·7–6·7, HL 1·18–1·59, HW 1·07–1·48, CI 87–93, SL 1·15–1·55, SI 105–114, PW 0·85–1·33, MTL 1·22–1·74. (28 measured.)

Anterior clypeal margin arcuate, convex to shallowly concave medially. Eyes convex, moderately protuberant. Sides of head in front of eyes convex and convergent anteriorly; behind the eyes the sides round into the very shallowly convex occipital margin. Alitrunk marginate throughout its length, the margination interrupted at the sutures. All dorsal surfaces transversely convex, the propodeum somewhat more markedly so than the pronotum or mesonotum. Pronotum armed with a pair of broad, flattened, triangular spines; propodeum with a pair of short upcurved spines or teeth. Promesonotal suture distinct; metanotal groove developed and deeply impressed. Petiole with six spines or teeth; a lateral pair of long spines directed upwards and weakly backwards, a dorsal pair of broad, acute teeth which are usually short and dentiform but occasionally projecting as distinct spines, and a pair of teeth or short spines situated below and behind the long lateral spines and directed backwards and upwards. The last mentioned pair are sometimes reduced to small tubercles. Anterior face of first gastral segment concave medially.

All dorsal surfaces of the body and appendages with numerous erect hairs, white or yellowish in colour. Pubescence sparse, grey or off-white.

Sculpturation variable, usually with the head and the dorsum of the alitrunk finely longitudinally rugose or striate-rugose with shining or weakly reticulate-punctate interspaces. Sometimes the sculpture is very much effaced or more distinctly reticulate-rugose, especially on the dorsum of the alitrunk. On the propodeal dorsum the rugae may be transverse or, in some individuals, diagonal. Gaster usually finely and densely reticulate-punctate but with all intergrades to the possession of a fine superficial reticulation only. Colour black, often entirely so but sometimes the legs (especially the fore tibiae) lighter, brown or yellow-brown.

Female as worker, answering to the above description except in the structure of the alitrunk. The pronotal spines are reduced and the sculpturation of the scutellar dorsum is usually distinctly reticulate-rugose. The female closely resembles *andrei*, the characters for their separation are given under that species. Alate females of *decemdentata* have been recorded as follows. GHANA : October. NIGERIA : March, July, August. SIERRA LEONE : August. UGANDA : August, December.

The varieties and subspecies noted in the synonymy were mostly founded upon quite trivial variations in colouration or in sculptural intensity. Some of the females constituting the variety *gustavi* had the dorsal petiolar teeth obtuse and little projecting. That the sculpturation of the species is variable was noted by Emery (1921 : 21), who pointed out that *fernandensis* differed from the 'typical' only in the gastral sculpturation, a point in fact previously recorded by Santschi (1909 : 396), who had stated that it was shiny and finely reticulate. The var. *flavipes* had the femora yellow to brown in colour, and the subspecies *tenuistriata* had sparser pubescence and rather effaced longitudinal rugulate sculpturation.

The material examined in the course of the present study embraces all the described infraspecific forms, with numerous intermediates, and places the previously described forms well within the limits of variation of the species. The limits in sculptural reduction are perhaps best shown by a female in the BMNH collection, from Uganda. In this specimen the mesoscutum is devoid of sculpturation except for a faint superficial reticulation; the scutellum and the propodeal dorsum are weakly reticulate-rugose and the whole body is very shiny.

The nests of *decemdentata* are usually constructed in rotten parts of standing trees, often a considerable distance above the ground. Branches which have previously suffered termite attack appear to be preferred, but the species has been recorded in Ghana nesting in the stump of a fallen cocoa tree. The species is arboreal and very rarely comes to ground level; it is apparently tolerated in trees by dominant species of the genera *Oecophylla* F. Smith and *Crematogaster* Lund. The presence of six spines or teeth on the petiole distinguishes this species from all others in the regional fauna except *andrei*, which is known only from the female.

MATERIAL EXAMINED.

SIERRA LEONE : Njala (*E. Hargreaves*). GHANA : Aburi (*P. M. Room*); Tafo (*C. A. Collingwood*); Bechem (*C. A. Collingwood*). NIGERIA : Gambari (*B. Bolton*); Ile-Ife (*J. T. Medler*). CAMEROUN : Meyo (*C. A. Collingwood*). UGANDA : Kampala (*M. Grabham*); Kawanda (*H. S. Darling*). CONGO (KINSHASA) : Eala (*P. Staner*).

Also recorded from Guinea, Ivory Coast, Equatorial Guinea (type data), and Congo (Brazzaville).

***Polyrhachis esarata* sp. n.**

(Text-figs 45, 55)

Holotype worker. TL 7·2, HL 1·56, HW 1·20, CI 77, SL 1·91, SI 159, PW 1·08, MTL 1·92.

Anterior clypeal margin arcuate and entire. Eyes convex and protuberant. Sides of head in front of the eyes almost straight, very gently convex and somewhat convergent anteriorly. Behind the eyes the sides of the head round into the broadly convex occipital margin. Alitrunk marginate throughout its length, interrupted only at the sutures. Dorsal surfaces of pronotum and mesonotum flat, dorsal surface of propodeum convex. Pronotum armed with a pair of spines, the outer edges of which are continuous basally with the margination of the segment. Propodeum with a pair of minute, tuberculiform teeth. Promesonotal suture distinct; metanotal groove developed and impressed. In dorsal view the marginations of the alitrunk are convergent posteriorly on the pronotum and mesonotum. On the propodeum the marginations are convex, broadest at about the midlength of the segment and converging anteriorly towards the metanotal groove and posteriorly towards the propodeal teeth where they are terminated. Petiole with a dorsal pair of spines and a lateral pair of small teeth. The dorsal spines are weakly divergent and somewhat back-curved. Anterior face of first gastral segment not concave medially.

Erect hairs present on the anterior clypeal margin and the gastral apex, and with a single pair on the dorsum of the head, situated on a level with the posterior borders of the eyes, behind the posteriormost extension of the frontal carinae. Pubescence dense on alitrunk, long, with a pale brassy tint on the dorsum, rather more greyish on the sides. On the head, gaster and appendages the pubescence very short, fine, greyish in colour and moderately dense.

Sculpturation everywhere of a fine, dense reticulation.

Colour black, the legs, especially the tibiae, very dark brown-black. Palpi and extreme tip of apical funicular segment of antenna yellow-brown.

Holotype worker, GHANA : Eastern Region, Bunso, by pyrethrum knock-down (sample B.3/8), 7.vii.1969 (*D. Leston*) (BMNH).

This species, a member of the complex of species surrounding *concava* and including *alluaudi* and its allies, is closest related to *decellei*. It may immediately be separated from *concava* and the more 'normal' forms in the complex by the presence of a single pair of erect hairs on the dorsum of the head. This character is shared only with *decellei*, from which it can be separated by the shape of the anterior clypeal margin, the construction of the petiole and the outline shape of the propodeal margination seen in dorsal view.

Polyrhachis fissa Mayr

(Text-figs 5, 26)

Polyrhachis fissus Mayr, 1902 : 301. Syntype workers and ♀, CAMEROUN : Victoria (*Buchholz*) (NM, Vienna).

Polyrhachis bequaerti Wheeler, 1922*a* : 267, fig. 76. Syntype workers, CONGO (KINSHASA) : Utiasiki, between Lubutu and Kirundu (*J. Bequaert*) (MCZ, Boston) [examined]. **Syn. n.**

Polyrhachis fissa subsp. *ugandensis* Arnold, 1954 : 294, figs 6, 6a. Holotype worker, UGANDA : Entebbe, Botanical Gardens (*G. Arnold*) (NMR, Bulawayo). **Syn. n.**

Worker. TL 5·2–6·3, HL 1·29–1·74, HW 1·26–1·64, CI 94–97, SL 1·33–1·74, SI 100–115, PW 0·96–1·22, MTL 1·26–1·59. (20 measured.)

Anterior clypeal margin arcuate, entire. Eyes convex, the sides of the head in front of the eyes straight to weakly convex, converging anteriorly; occipital margin convex. Alitrunk marginate throughout its length, the margination interrupted at the sutures. Pronotal spines acute, subtriangular in shape, very broad at the base; their lateral margins more or less straight and continuous with the pronotal margination. Pronotum usually transversely convex on the disc, passing through a slight concavity at the bases of the spines. Propodeum armed with a pair of short, upcurved teeth. Promesonotal suture distinct, transverse, very slightly or not at all arched. Metanotal groove well developed and deeply impressed. In lateral view the propodeum rises almost vertically from the groove, passes through a narrow convexity above and then slopes strongly towards the spines. In dorsal view the propodeal marginations diverge posteriorly. Petiole with four spines, usually of almost equal length, the dorsal pair slightly shorter than the lateral. All the spines are curved posteriorly. Middle of anterior face of first gastral segment concave to receive the convex posterior face of the petiole.

Standing hairs usually present on all dorsal surfaces but may be absent from the first gastral tergite and are always absent from the antennal scapes. At the extreme apex of the scape a few hairs are usually present, projecting in line with the long axis of the shaft. Hairs white to grey-white; pubescence greyish, very sparse.

Sculpturation variable. Clypeus, head in front of the eyes, and the gaster finely superficially reticulate and polished. Head above and behind the eyes either similar to the above or finely and densely longitudinally striate-rugose. Dorsum of the pronotum and mesonotum longitudinally striate-rugose, varying in intensity from finely to deeply incised. Dorsum of propodeum transversely striate, the striae deeply incised and distinct.

Colour black, the gaster distinctly shining. Antennal funiculae usually lighter, brown to yellow-brown. Legs varying from black to yellow-brown, often with the tibiae lighter in colour than the femora.

Female as worker, with the usual differences associated with the caste. The spines of the pronotum and petiole, and the propodeal teeth tend to be less well developed than in the worker. Alate females have been recorded as follows, GHANA : June, November.

Arnold's subspecies *ugandensis*, which was described from a single specimen, is one of the more lightly sculptured individuals of this species.

In the original description of *bequaerti*, Wheeler stated that it 'clearly belongs to the group comprising *fissa* Mayr and *monista* Santschi, but is quite distinct from any of the described species'. The syntypes of *bequaerti* were compared to a specimen of *fissa* determined by Mayr and were found to be indistinguishable. Comparisons of other specimens of *fissa* both to the types and the original description of *bequaerti* failed to show any grounds upon which the two could be separated.

The closest relative of this species is *lauta*, from which it may be distinguished by the direction of the propodeal sculpturation and the presence of a facial groove and pit in *lauta*, which is situated close to the antennal insertion.

P. fissa is arboreal, workers usually being found running on the trunks of trees. The species appears to be restricted to forests and according to Wheeler (1922*a* : 269) the nests are composed of vegetable particles and silk and are constructed between two adjacent leaves, which are gummed together to form the walls of the nest.

MATERIAL EXAMINED.

GHANA : Nswam (*P. M. Room*); Aburi (*P. M. Room*); Tafo (*B. Bolton*), (*C. A. Collingwood*); Asamankese (*P. M. Room*); Tafo, long series without name of collector; Korangang (*J. Paine*). CAMEROUN : no loc. (*G. Mayr* coll.).

Also recorded from Congo (Kinshasa) (type data), Uganda (type data), and Equatorial Guinea.

Polyrhachis gagates F. Smith

Polyrhachis gagates F. Smith, 1858 : 71, pl. 4, fig. 14. Holotype worker, SOUTH AFRICA : Natal, Durban (BMNH) [examined].

Polyrhachis gagates var. *congolensis* Santschi, 1909 : 399. Syntype workers, CONGO (BRAZZAVILLE) : Mandouga (*A. Weiss*) (NM, Basle) [examined]. **Syn. n.**

Polyrhachis nigriseta Santschi, 1909 : 399. Holotype worker, CONGO (BRAZZAVILLE) : Mindouli (*A. Weiss*) (NM, Basle) [examined]. **Syn. n.**

Polyrhachis nigriseta var. *clariseta* Santschi, 1909 : 400. Syntype workers, CONGO (BRAZZAVILLE) : Mandouga (*A. Weiss*) (NM, Basle) [examined]. **Syn. n.**

Polyrhachis gagates subsp. *indefinita* Forel, 1913*c* : 349. Syntype workers, CONGO (KINSHASA) : Katanga, Sankisia (*J. Bequaert*) (MRAC, Tervuren) [examined].

Polyrhachis gagates subsp. *obsidiana* Emery, 1921 : 21. Holotype worker, GABON (probably in MCSN, Genoa). **Syn. n.**

Polyrhachis gagates subsp. *indefinita* var. *acheron* Arnold, 1924 : 746. Holotype worker, RHODESIA : Bulawayo, Hillside, 27.vi.1915 (*G. Arnold*) (BMNH) [examined]. [Name not available].

Worker. TL 11·3–13·2, HL 2·66–3·03, HW 2·04–2·40, CI 76–81, SL 3·34–3·56, SI 147–160, PW 1·59–1·74, MTL 3·59–4·08. (30 measured.)

Mandibles with five teeth; anterior clypeal margin entire, in profile the clypeus is usually convex above and concave below so that the anterior margin projects over the basal borders of

the mandibles as a weak shelf. Eyes well developed, flat to weakly convex. Pronotal spines long, acute and usually somewhat incurved; the propodeal armament consisting of a pair of upcurved teeth of variable shape and size, sometimes represented by a pair of blunt, dorsoventrally flattened tubercles. Alitrunk marginate laterally throughout its length, broken at the promesonotal suture and the metanotal groove, and often notched or concave on the sides of the mesonotum. Marginations of alitrunk not produced upwards or outwards as flanges or lamellae; all dorsal surfaces of alitrunk flat to transversely gently convex. Petiole with four spines, of which the dorsal pair are always several times longer than the laterals. The dorsal pair may be long and broadly sinuate, following the contours of the anterior face of the gaster, or shorter and merely recurved. The lateral pair of petiolar spines are short and thick or reduced to a pair of teeth.

Erect hairs present on the head and gaster and present on the dorsum of the pronotum. Hairs always absent from the sides of the head between eye and ventrolateral margin, dorsal surfaces of mesonotum and propodeum; usually also absent from scale of petiole. Pubescence everywhere sparse to absent, greyish or white in colour, never so dense as to render the underlying sculpture invisible.

Sculpturation variable. Clypeus usually with a fine, broken and partially effaced reticulorugulation overlying a superficial reticulation. Dorsum of head usually finely reticulate-rugose with a longitudinal direction. In a majority of cases the pronotum has weak, broken, irregular longitudinal rugae, sometimes with occasional weak transverse rugae linking those running longitudinally. Rarely the sculpturation is of fine, dense rugulation with scattered small punctures in the interspaces. Mesonotum and propodeum similar to the pronotum but the sculpturation usually somewhat more coarse. Very rarely the entire dorsum of the alitrunk with a fine dense rugoreticulum. Gaster with an extremely fine superficial reticulation, the edges of component reticulae scarcely or not at all raised, so that the surface is smooth. Colour black, head and alitrunk dull or shining, the gaster always highly polished.

Female as worker, larger, the lateral marginations of the alitrunk distinct only on the propodeum. Spines of pronotum and scale of petiole reduced. Sculpturation and distribution of erect hairs as in worker, but in one female in the BMNH collection the mesoscutum is as highly polished as the gaster, having the same superficial reticulation. Alate females have been recorded as follows, RHODESIA : July. SOUTH AFRICA : April.

As will be noted from the above description *gagates* is a variable species, as are its closest relatives *schistacea* and *militaris*, and some argument has ensued over the interpretation of their relationships, as discussed below and under *schistacea*.

In the rush to describe subspecies and varieties earlier this century *gagates* was equipped with four infraspecific names and thus came off reasonably well when compared to *militaris* or *schistacea*; but even amongst these four names there was confusion. The variety *congolensis* was erected by Santschi to include forms with rather more dense pubescence than was apparent in the type, although it should have been obvious even at that time that the pubescence was variable. Although the description of this variety made it clear that the species was *gagates*, Forel (1913*b* : 357) referred it to *schistacea* as race *congolensis* after explaining that he considered the two species (*schistacea* and *gagates*) to be synonymous. However, he did not formally synonymise one to the other but stated, 'I therefore think that *gagates* should be reunited as a race of *schistacea* – or vice versa – as both species date from 1858'. In the same year, however, he described *gagates* subsp. *indefinita*.

This led Wheeler (1922*b* : 996, 1001) to refer to *gagates* subsp. *indefinita* but *schistacea* subsp. *congolensis* in his check-list. These two infraspecific names were shown to be synonymous by Santschi (1924 : 224) in the same year that Arnold

described the variety *acheron* for forms with effaced sculpturation and more convex eyes than were found in 'typical' *gagates* or in the subspecies *indefinita*.

The remaining infraspecific name, *obsidiana*, was given as a five-line description of a single worker from Gabon which was smaller than usual and with finer, less distinct sculpturation. The whole of the dorsum of the alitrunk, petiole and head were shiny and almost devoid of pubescence, the head narrower than usual with the eyes convex. This description also fits *acheron* very well.

P. nigriseta was originally described as a distinct species but Forel (1913*c* : 349) thought that '*nigriseta* is perhaps a race of *gagates* and not a distinct species'. However, in the same year (Forel, 1913*b* : 357) he referred to *nigriseta* as a race of *schistacea*. In the following years Santschi (1914*a* : 140) continued to treat *nigriseta* as a good species whilst Wheeler (1922*b* : 1002) followed Forel and reduced it to a subspecies of *schistacea*. Forel's first conjecture was, however, correct as the present investigation has shown *nigriseta* to be a straight synonym of *gagates*, of the form in which the sculpturation is reduced everywhere to a fine superficial reticulation and in which the eyes are convex. The variety *clariseta* is a very ordinary *gagates*, with the eyes only moderately convex and the sculpturation reduced.

At the present time *gagates* may be considered as a reasonably distinct, variable species but its relationships to other members of the complex, especially *militaris* and *schistacea* stand in need of further investigation than is possible within the scope of the present work. Suffice to say that variation within the species occurs chiefly in degree of convexity of the eyes, density of pubescence, intensity of sculpturation, location of erect hairs and in details such as length of petiolar and propodeal spines and the glossiness of the integument, which on the head and alitrunk may range from dull black to very shining. Intergrades between all the described infraspecific forms exist and individual variations may be seen in members of the same colony. A single worker from Kenya shows an eye shape and distribution of erect hairs more typical of *schistacea* but in all other respects resembles *gagates*. This may represent a genuine hybrid or may be an extreme individual variant.

Ground nesting ants inhabiting savannah and rather arid regions, more rarely penetrating into scrub forest. The nests are described by Wheeler (1922*a* : 262) as being excavated directly into a sandy substrate at the base of a tuft of grass, the entrance hole being surrounded by a wide crater of discarded sand grains. Arnold (1924 : 746) also notes that the species nests under rocks and that the entrance was 'surmounted by a wall of woven material, which also lined the first three or four inches of the gallery', a feature also noted by Wheeler.

MATERIAL EXAMINED.

RWANDA : Kibungu (*R. Verhulst*); Nyanza (*L. Burgeon*). CONGO (KINSHASA) : Gandaljika (*P. de Francquen*); Lomami, Lusuku (*P. Quarre*); Kasongo, Kamato (*P. L. G. Benoit*); Mayumbe, Tshiobo N'Goy (*A. Collart*); Kinshasa (*A. Collart*); Kunungu (*H. Schouteden*); Urundi, Bururi (*F. Francois*); Mayidi (*P. van Eyen*); Kwango, Dengo (*Vleeschouwers*). ANGOLA : Cabinda (*Ph. Allaer*). KENYA : Diani

Beach (*N. L. H. Krauss*); Merifano (*Gregory*). TANZANIA : Zanzibar, Chukwani (*E. S. Brown*); Zanzibar, Chakwa (*E. S. Brown*); Mpala (*Oberthur*); Tembwe (*H. Schouteden*). MALAWI : Mlanje Boma (*S. A. Neave*); Between Mangoche and Chikala Boma (*S. A. Neave*); Nyika Mts (*A. Whyte*); Lingadzi (*W. A. Lamborn*). RHODESIA : Bulawayo (*G. Arnold*); Selukwe (*P. E. V. Zealley*). MOZAMBIQUE : Delagoa (*Liengme*). SOUTH AFRICA : Natal, Durban (*L. B. Cooper*); Durban (*F. B. Marley*); Wonderboom (*T. D. A. Cockerell*); Shiluvane (*Junod*).

Also recorded from Uganda and Zambia.

Polyrhachis laboriosa F. Smith

(Text-fig. 24)

Polyrhachis laboriosa F. Smith, 1858 : 72, pl. 4, figs 21, 22. Holotype worker, SIERRA LEONE (*D. F. Morgan*) (BMNH) [examined].

Polyrhachis laboriosa var. *architecta* Santschi, 1924 : 224. Syntype workers, CONGO (KINSHASA) : Kondue (*E. Luja*) (probably in NM, Basle). **Syn. n.**

Polyrhachis hortulana Arnold, 1955 : 735, fig. 3. Holotype worker, UGANDA : Entebbe, Botanical Gardens (*G. Arnold*) (NMR, Bulawayo) [examined]. **Syn. n.**

Worker. TL 10·2–11·6, HL 2·15–2·25, HW 1·56–1·81, CI 71–79, SL 2·85–3·34, SI 182–196, PW 1·19–1·36, MTL 3·26–4·11. (30 measured.)

Anterior clypeal margin arcuate, entire, the clypeus with a distinct median, longitudinal carina. Eyes strongly convex, the sides of the head behind the eyes strongly convergent to a short convex occipital margin. Alitrunk marginate throughout its length, interrupted by impressions at the sutures. Pronotum and propodeum weakly concave transversely, the former armed with a pair of long acute, divergent spines, the latter with a pair of small teeth. Promesonotal suture distinct, metanotal groove impressed. In profile the propodeum rises abruptly from the metanotal groove, behind which it slopes convexly to the propodeal teeth. Petiole armed with a single pair of spines, set at the dorsolateral corners of the scale, weakly divergent, their apices strongly hooked, directed posteriorly and somewhat laterally.

All dorsal surfaces of head, alitrunk and gaster with numerous erect hairs, varying in colour from grey to golden-yellow. Pubescence dense, mostly hiding the sculpturation on the gaster, usually grey on the head and alitrunk, golden or bronzy on the gaster, but sometimes the pubescence of the pronotal dorsum is also yellow or golden.

Head reticulate-punctuate except on the vertex where the sculpturation is of longitudinal rugulation. Pronotal dorsum superficially reticulate-punctate, the mesonotum and propodeum usually more coarsely sculptured, rugulose or more strongly reticulate-punctate; the sculpturation of the pronotum may be concealed by the pubescence. Gaster finely reticulate-punctate, mostly hidden by the dense pubescence.

Female as worker, larger, with the marginations of the alitrunk less distinct. Pronotal spines and propodeal teeth reduced, the latter often to a pair of tubercles. Alate females have been recorded as follows, GHANA : July, September. CONGO (KINSHASA) : March, August.

Santschi's variety *architecta* had the petiolar spines more remote from each other than is usual and the pubescence shorter and greyish yellow on the alitrunk. The distance between the spines is in fact variable and *architecta* must be regarded as nothing more than a trivial variation, well within the limits of the species. The type and only known specimen of Arnold's *hortulana* is separable from *laboriosa* only in its greyish gastral pubescence and the very low number of erect hairs on the

dorsal surfaces of the body. In fact these are restricted to a single one on the pronotum and propodeum and are absent from the dorsal surface of the gaster. Closer examination revealed that numerous hairs had been lost and that the anterior face of the first gastral segment was about as hairy as in other members of the species. It was concluded that the specimen was most probably an early-brood worker from a young colony. This conjecture is supported by the small size of the individual (lowest in the range given above) and the apparent deformity of the petiolar spines noted by Arnold. The presence of grey gastral pubescence may be attributed to the same cause, as may the reddish brown tinge of the gastral integument, which is noticeable in other teneral forms in the species.

A member of the *militaris*-group, *laboriosa* is easily separated from all other species by the unique form of the petiole.

The nests of this species, common in West Africa, are well known and consist of a mixture of vegetable fragments and small twigs bound together by silk and fungal hyphae and adherent to the undersides of leaves or situated at the fork of small branches. Form and construction of the nest have been discussed many times, for example by Wheeler (1922*a* : 259), Santschi (1909 : 393) and Collart (1932). *P. laboriosa* appears to be restricted to forested areas. When disturbed the workers curve the gaster under the alitrunk to eject formic acid, and also tap the gaster upon the substrate, making a rattling noise when performed by a number of workers together. If individual arboreal foragers are disturbed they tend to release their grip on the bark and fall into the undergrowth.

MATERIAL EXAMINED.

SIERRA LEONE : no loc. GHANA : Bibianaha (*Spurrel*); Ankasa Forest Reserve (*O. W. Richards*); near Kumasi (*B. M. Gerard*); Tafo (*C. A. Collingwood*); Bawdna (*N. D. Jago*); Adeiso (*P. M. Room*). NIGERIA : Itu (*W. A. C. Cockburn*); Lagos (*G. Strachan*); Gambari (*B. Bolton*). ANGOLA : no loc. (*Welwitsch*); Vale de Loge (*A. P. Ferrao*); Cabinda (*Ph. Allaer*). CONGO (KINSHASA) : Stanleyville (*A. Collart*); Kwamouth (*H. Schouteden*); Flandria (*R. P. Hulstaert*); Eale-Bokatola-Bikoro (*J. Staner*); Eala (*H. J. Bredo*); Butu (*R. P. Hulstaert*); Sankuru, Gandaljika (*P. de Francquen*); Equateur, Bokamu (*R. P. Lootens*); Mayumbe, Tshenge (*A. Collart*); Tshuapa, Bokungu (*Dupuis*); Mayidi (*P. van Eyen*); Eala (*P. Staner*); Thysville (*P. Basilewsky*); Uele (*R. P. H. L. Bertels*); Haut-Uele (*L. Burgeon*); Leopoldville (*A. Tinant*); Eala (*J. Vrydagh*); Likimi (*A. Collart*); Leopoldville (*R. P. Hulstaert*); Ituri, Masua (*A. Collart*); Lukobla (*H. Lebeau*); Ubangi, Bumba (*J. Eugene*).

Also recorded from Ivory Coast, Togo, Cameroun, Equatorial Guinea, Congo (Brazzaville), and Uganda (type data).

Polyrhachis latispina Emery

Polyrhachis atalanta Wheeler, 1922*a* : 263, fig. 71. Holotype ♀, CONGO (KINSHASA) : Stanleyville [=Kisangani] (*Lang* and *Chapin*) (probably in MCZ, Boston). [Nom. preocc. (not *atalanta* Emery).]

olyrhachis latispina Emery, 1925 : 206. [nom. substit. for *atalanta* Wheeler.]

Polyrhachis iperpunctata Menozzi, 1942 : 181, fig. 4. Holotype worker, EQUATORIAL GUINEA : Fernando Po, Musola, 11.ix.1939 (*H. Eidmann*) (probably in Istituto di Entomologia, Bologna). **Syn. n.**

Polyrhachis iperstriata Menozzi; Eidmann, 1944 : 424. [lapsus.]

Worker. TL 9·4–11·2, HL 2·26–2·40, HW 1·88–2·12, CI 83–88, SL 2·30–2·44, SI 115–122, PW 1·58–1·76, MTL 2·48–2·52. (3 measured.)

Anterior clypeal margin arcuate and entire. Eyes convex, the sides of the head in front of the eyes convex and somewhat convergent anteriorly. Behind the eyes the sides round into the shallowly convex occipital margin. Alitrunk marginate throughout its length, the margination interrupted at the sutures. Pronotum armed with a pair of flattened triangular teeth; the propodeum with a pair of upcurved short spines between which runs a strongly arched transverse ridge separating the dorsum from the declivity. Promesonotal suture distinct; metanotal groove impressed. Petiole armed with four spines; the dorsal pair long, recurving over the base of the first gastral tergite and very broad at their bases. The lateral pair narrow, markedly shorter than the dorsals, somewhat upcurved. Anterior face of first gastral segment shallowly concave medially.

Head, body and appendages equipped with numerous fine, whitish, erect hairs; pubescence sparse, short and scattered.

Clypeus finely reticulate-punctate, overlaid by a loose rugosity. Head finely and densely longitudinally rugose, the spaces between the rugae finely reticulate-punctate. On the sides of the head the rugae are less regular and tend to form a rugoreticulum, especially below and behind the eyes. Dorsum of alitrunk sculptured as head, the sides predominantly reticulate-rugose but with some longitudinal rugulation on the pronotum and propodeum. Declivity of propodeum extremely finely reticulate and shining, forming a marked contrast to the heavily sculptured dorsum. Petiole transversely rugose on the lower part of its anterior surface, longitudinally so above and between the spines. First gastral tergite reticulate-punctate, overlaid by a fine, dense, longitudinal rugulation which tends to peter out on the posterior half of the segment. Colour black, with parts of the legs and extreme apex of funiculus brown or yellow-brown.

Female answering to the above description apart from the normal modifications of the alitrunk, but differing as follows;

1. Longitudinal rugosity everywhere tending to be coarser and less regular.
2. On the pronotum and mesoscutum the rugae appear to diverge from an anteromedian point. This is more pronounced on the pronotum and is accounted for by the foreshortening of the segment in this caste.
3. The fine longitudinal rugae of the first gastral tergite occupy approximately one-third of the length of the segment.
4. Dorsal petiolar spines shorter with respect to the laterals than in the worker.

Four specimens (one female) from two localities, kindly loaned to me by Dr J. Decelle of the Musée Royal de l'Afrique Centrale, Tervuren, have allowed the association of *latispina* with *iperpunctata*, the latter proving to be the worker caste of the former. The original descriptions of the two are sufficient to indicate synonymy, but Menozzi's figure of the head of *iperpunctata* is somewhat misleading. The figure given by Wheeler presents a more accurate representation of the head shape in this species.

Professor E. Mellini informs me that the holotype of *iperpunctata* could not be located in the Menozzi collection in the Instituto di Entomologia, Bologna.

Eidmann (1944 : 466) records the nesting site as follows. 'I found this [species] only a single time at our experimental area at Musola, where they were nesting in some hollow petioles of dead and fallen leaves of a tree fern. The gaps and openings

in the inhabited stems were closed off with a coarse carton mass.' The species is a member of the *militaris* group, and Wheeler (1922*a* : 264) regarded it as closely related to *sulcata*. However, the construction of the propodeum, with its complete margination and transverse ridge between the spines separates it from the above species. It is probable that Wheeler based his assumption on the sculpturation, which appears similar in *latispina* to the original description of *sulcata*, but is so very different when the species are compared directly.

MATERIAL EXAMINED.

CONGO (KINSHASA) : Haut-Uele, Manda (*H. Schouteden*); Eala (*H. J. Bredo*).
Also recorded from Equatorial Guinea (type data).

Polyrhachis lauta Santschi

(Text-figs 6, 37)

Polyrhachis lauta Santschi, 1909 : 397, fig. 19. Holotype ♀, CONGO (BRAZZAVILLE) : Brazzaville (*A. Weiss*) (NM, Basle) [examined].

Polyrhachis lauta var. *localis* Forel, 1913*b* : 359. Holotype ♀, CONGO (KINSHASA) : Congo da Lemba (*R. Mayne*) (MRAC, Tervuren) [examined]. **Syn. n.**

Polyrhachis lauta var. *laeta* Emery, 1921 : 22. Syntype ♀♀, CAMEROUN (*L. Conradt*) (probably in MCSN, Genoa). **Syn. n.**

Worker (previously undescribed). TL 5·5–6·2, HL 1·29–1·62. HW 1·22–1·54, CI 94–95, SL 1·29–1·54, SI 100–106, PW 0·93–1·29, MTL 1·18–1·52. (6 measured.)

Anterior clypeal margin arcuate and entire; posterior clypeal suture very faint, almost invisible. A short, longitudinal, shallow groove terminating in a depression present close to the outer margin of the antennal socket. Eyes weakly convex, sides of head in front of eyes strongly convergent. Behind the eyes the sides rounding into the very broad and convex occipital margin. Alitrunk marginate throughout its length, interrupted only at the sutures. Promesonotal suture incised; metanotal groove deeply impressed. Pronotum armed with a pair of broad, flattened spines; propodeum with a pair of short, upcurved spines. Lateral marginations of the propodeum divergent posteriorly in dorsal view. Pronotal and mesonotal dorsa convex, the propodeum very similar in shape to that of *fissa*. In profile the anterior portion of the propodeum rises almost vertically from the metanotal groove, passes through a strong dorsal convexity and slopes steeply to the propodeal spines. Petiole with two pairs of spines, the lateral notably longer than the dorsal pair; the latter strongly recurved or hooked apically. Anterior face of first gastral segment concave medially.

Standing hairs sparse, present on the dorsum of the head, pronotum and mesonotum, absent from the antennal scapes, propodeum, petiole and first gastral segment.

Head and gaster very finely, superficially reticulate. Dorsal surfaces of alitrunk extremely finely, densely, longitudinally striate. Colour black, the apical funicular segments yellow-brown, the legs black or black-brown.

Female as worker, resembling it in all respects except for modifications associated with differences in caste. The propodeum in the female is strongly transversely concave between the spines in dorsal view. The entire body is sculptured with a fine superficial reticulation.

Two varieties of the female were described. The variety *laeta* was erected by Emery for specimens differing from the type by having oval eyes and the dorsal pair of petiolar spines less strongly recurved at their apices. The eyes of the type of the species were described as reniform by Santschi, but the emargination of the

ventral border of the eye is so shallow that oval could also be a reasonably accurate term.

In *localis* the propodeal teeth were described as smaller and more obtuse than in the type, and the metanotal groove less deep. Comparison of the two types has shown that these are no more than individual variations.

Previous authors overlooked the presence of the facial pit and groove situated just lateral of the antennal socket, and this character coupled with the general body form, fine sculpturation and shape of petiolar spines linked the females to a series of *fissa*-like workers in the BMNH collection. The species is the closest known relative of *fissa*, differing from it by the presence of a facial groove, intensity and direction of sculpturation and form of petiolar spines.

MATERIAL EXAMINED.

GHANA : Tumu (*P. M. Room*). UGANDA : Tero Forest (*C. C. Gowdey*).

Also recorded from Cameroun (type data), Congo (Kinshasa) (type data), and Congo (Brazzaville) (type data).

Polyrhachis medusa Forel

Polyrhachis schistacea var. *medusa* Forel, 1897 : 206. Syntype workers, ♀, ♂, TANZANIA : Zanzibar (*A. Voeltzkow*) (MHN, Geneva).

Polyrhachis medusa Forel; Forel, 1970*b* : 92.

Polyrhachis medusae Forel; Santschi, 1914*a* : 140. [Misspelling.]

Worker. TL 12·6–14·4, HL 2·74–3·00, HW 2·40–2·52, CI 84–88, SL 3·37–3·56, SI 139–142, PW 2·24–2·52, MTL 3·51–3·70. (13 measured.)

Anterior clypeal margin straight to shallowly and broadly concave. Eye shape ranging from weakly concave to weakly convex but usually more or less flat. Sides of head and occipital margin convex; the eyes when flat not breaking the outline of the sides of the head in full-face view. Alitrunk marginate throughout its length, the marginations interrupted at the promesonotal suture and the impressed metanotal groove. Pronotal spines long, narrow and weakly incurved; propodeal armament reduced to a pair of blunt tubercles. The margination of the mesonotum and propodeum is often irregular, giving a chipped and jagged appearance in dorsal view. Dorsal surfaces of alitrunk transversely convex. Petiole with a pair of spines at the dorsolateral angles and a pair of laterally placed strong, acute teeth.

Head, body and appendages densely clothed with long, erect white hairs, some of which are curved or sinuate. Pubescence everywhere long and dense, white or off-white in colour and completely hiding the sculpturation.

Sculpturation everywhere of a very fine, superficial reticulation (revealed by scraping off the pubescence). Colour black, but specimens have a greyish appearance due to the very dense pubescence.

Female as worker, with the usual differences associated with this caste. Propodeum not marginate, the dorsum rounding into the sides. Alate females have been recorded as follows. TANZANIA : May, September.

Closely related to *schistacea*, from which it may be separated by the extremely dense clothing of long hairs and the density of the pubescence, which conceals the fine superficially reticulate sculpturation. Casual observation may possibly confuse this species with more densely hairy individuals of *militaris*, but the characters quoted under couplet 45 of the key to species will serve to discriminate the two.

Apparently nothing is known of the biology of this large species but because of its size and affinities one would expect it to be a ground nesting species as *schistacea*. Santschi (1914*a* : 140) comments upon a large Clubionid spider, 'probably *Apochinomma formicaeforme* Pavesi', which mimics *medusa*.

MATERIAL EXAMINED.

KENYA : Miongave, near Mombasa (*L. F. Brown*); Kilifi (*van Someren*). TANZANIA : Dar-es-Salaam (*A. W. J. Pomeroy*); Duthuni (*A. Loveridge*); Zanzibar (Forel coll.); Tanga (*L. F. Brown*); Zanzibar, Chakwa (*E. S. Brown*). MOZAMBIQUE : Pt Amelia (*F. V. Beste*). 'EAST AFRICA' : Tendaguru (*W. E. Cutler*).

Polyrhachis militaris (Fabricius)

Formica militaris Fabricius, 1781 : 493. Holotype ♀, 'TROPICAL AFRICA' (BMNH) [examined].
Polyrhachis militaris (Fabricius) F. Smith, 1858 : 72, pl. 3, fig. 5, and pl. 4, fig. 35.
Polyrhachis militaris subsp. *cupreopubescens* Forel, 1879 : 120. Holotype ♀, 'TROPICAL AFRICA' (*Sauss*) (probably in MHN, Geneva). **Syn. n.**
Polyrhachis militaris subsp. *striativentris* Emery, 1891 : 566. Syntype workers, IVORY COAST : Assinie (*Ch. Alluaud*) (MCSN, Genoa) [examined]. **Syn. n.**
Polyrhachis militaris subsp. *cupreopubescens* var. *transversaria* Forel, 1901*b* : 77. Holotype ♀, LIBERIA (*Hadler*) (probably in MHN, Geneva). [Name not available.]
Polyrhachis militaris var. *calabarica* Forel, 1907*a* : 38. Syntype workers, NIGERIA : Old Calabar, vi.1892 (*Luke*) (MHN, Geneva) [examined]. **Syn. n.**
Polyrhachis militaris var, *ssibangensis* Forel, 1907*a* : 38. Holotype worker, GABON : Ssibange (*Soyaux*) (MHN, Geneva) [examined]. **Syn. n.**
Polyrhachis militaris subsp. *cupreopubescens* var. *argentatus* Stitz, 1910 : 150. Syntype workers, CAMEROUN : Bibundi (*Tessmann*). [Name not available (not *argentatus* Fabricius).]
Polyrhachis militaris subsp. *bruta* Santschi, 1912 : 166. Holotype ♀, CONGO (*Bondroit*) (probably in NM, Basle). **Syn. n.**
Polyrhachis militaris subsp. *cupreopubescens* var. *epinotalis* Forel, 1913*b* : 357. Syntype workers, CONGO (KINSHASA) : Elizabethville [=Lubumbashi], ix.1911 (MHN, Geneva) [examined]. [Name not available.]
Polyrhachis militaris subsp. *cupreopubescens* var. *sankisiana* Forel, 1913*c* : 348. Syntype workers, CONGO (KINSHASA) : Katanga, Sankisia (*J. Bequaert*) (MHN, Geneva) [examined]. [Name not available.]
Polyrhachis militaris subsp. *cupreopubescens* var. *nkomoensis* Forel, 1916 : 447. Syntype workers, ♀♀, ♂♂, CONGO (KINSHASA) (*H. Kohl*) (MHN, Geneva) [examined]. [Name not available.]
Polyrhachis militaris subsp. *cupreopubescens* var. *dido* Wheeler, 1922*a* : 261. [Name not available.]
Polyrhachis militaris subsp. *cupreopubescens* var. *pleurata* Santschi, 1924 : 223. Syntype workers, CONGO (KINSHASA) : Yambata (*di Giorgi*) (probably in NM, Basle). [Name not available.]

Worker. TL 10·8–14·1, HL 2·59–3·41, HW 1·96–2·96, CI 75–86, SL 3·18–3·89, SI 132–162, PW 1·74–2·34, MTL 3·51–4·45. (30 measured.)

Anterior clypeal margin truncate medially. Eyes weakly to strongly convex, the sides of the head in front of the eyes convex. Behind the eyes the sides may round immediately into the occipital margin, may be convergent posteriorly or may be more or less parallel, rounding into the occipital margin posteriorly. In some specimens the dorsum of the head behind the eyes is separated from the sides by a blunt angle. Alitrunk strongly marginate throughout its length, interrupted at the sutures. On each segment the margination projects laterally or

vertically as a rim or flange; usually this is best developed on the pronotum where the margination is continued anteriorly on to the spines as a raised dorsal ridge. Pronotum armed with a pair of long, acute spines; propodeum with a pair of upcurved teeth or spines of very variable length. Promesonotal suture distinct; metanotal groove impressed. Petiole armed dorsally with a pair of long spines, and laterally with a pair of teeth. Anterior face of first gastral segment vertical or very shallowly concave.

Erect hairs abundant on all surfaces, greyish, silvery, golden or yellow-brown in colour. Pubescence everywhere dense, long, variable in colour and in arrangements of colour. The pubescence usually golden or grey to silver-grey, often with both colours occurring on the same specimen. The most common colour forms of the pubescence are as follows.

1. Entirely golden.
2. Golden, with sides of alitrunk grey or silver-grey.
3. Dorsum of alitrunk golden, the rest grey or silver-grey.
4. Dorsum of gaster golden, the rest grey or silver-grey.

Pubescence densest on the dorsum of the alitrunk and gaster, often completely masking the underlying sculpturation, especially on the former.

Sculpturation of head and alitrunk of a fine, longitudinal striate-rugulation, visible on the head and usually also visible on the outer edges of the pronotal dorsum at the bases of the spines. Removal of the propodeal pubescence shows that the sculpturation on this segment, although usually longitudinal, may be transverse or even diagonal. Gaster usually finely and densely reticulate-punctate, but occasionally striate-rugose, either longitudinally or transversely, or in some cases, whorled.

Female as worker but with finer sculpturation, reduced pronotal spines, petiolar spines and propodeal teeth. The margination of the propodeum is reduced and that of the pronotum indistinct.

Alate females have been recorded as follows, GHANA : June, September, October. NIGERIA : May. UGANDA : January, July, September, October. KENYA : November. TANZANIA : February, June. CONGO (KINSHASA) : January, February, March, April, September, November.

P. militaris is the largest, one of the most common, and unfortunately the most variable species of the genus found in forested Africa. The confusion which has surrounded *militaris* and its closest associates is discussed under the species *gagates* and *schistacea*, and with the separation of these species and their numerous synonyms one has remaining some eleven infraspecific names attached to, and synonymous with *militaris*. The majority of the varietal and subspecific names noted above were founded on quite trivial variations in colour or colour arrangement of the pubescence, details of sculpturation, or relative lengths of spines. The forms *striativentris* and *transversaria* were founded on specimens with striate-rugose gastral sculpturation, the former with the striae longitudinal, the latter with them transverse. Closer investigation shows that these forms are apparently confined to West Africa, but a short survey undertaken by the author at Tafo, Ghana, during 1970 showed that all forms of striate gastral sculpturation were present, including loops, whorls and even double whorls, and on one occasion specimens with striate gasters were found in a nest in which the workers had predominantly a reticulate-punctate gastral sculpturation. Two series from Ghana in the BMNH collection show that this is not uncommon. In one case, of four workers mounted on the same card, one is *transversaria*, one *striativentris* and the other two 'normal' *militaris*. That the collector was unaware of this is indicated by the fact that the specimens are mounted on their sides or upside-down.

Intergrades exist between all the described forms of pubescence colouration and distribution, and slight variations in pubescence are often to be found in the same nest series. One interesting point is that forms in which the pubescence is golden everywhere appear to be restricted to northern East Africa, and a long series from the Tero Forest, Uganda, are notable for their very bright golden pubescence. In West Africa the golden colour is usually paler or has a coppery or bronze tint.

The species is arboreal and nests are made in rotten parts of standing trees, often a considerable distance above the ground. Nests are usually constructed in the trunk or the stub of a broken branch, or in branches which have previously been mined by termites. As far as is known, silk is not utilised in nest building. If the colony is disturbed the workers curve their gasters beneath the alitrunk and eject quantities of formic acid. At the same time they tap their gasters on the floor of the nest, giving a distinct rattling sound when performed by a number of workers. Foraging is undertaken singly and the ants cross the forest floor from tree to tree. If disturbed whilst on a branch or a tree trunk the workers release their grip and fall to the ground. Workers of *militaris* are mimicked in West Africa by nymphs of a coreid bug, probably belonging to the genus *Mirperus* Stål.

MATERIAL EXAMINED.

IVORY COAST : loc. illegible (Santschi coll.). SIERRA LEONE : no further data. GHANA : Bibianaha (*Spurrel*); Tafo (*B. Bolton*) (*A. B. S. King*), (*C. A. Collingwood*); Enchi (*B. D. Peake*); Ankasa Forest Reserve (*O. W. Richards*); Kunso (*D. J. Cross*); Akwaseho (*D. J. Cross*); Worawora (*C. A. Collingwood*); Kibi (*P. M. Room*); Samreboi Forest (*C. A. Collingwood*); Bunso (*C. A. Collingwood*). NIGERIA : Ilesha (*L. E. H. Humfrey*); Southern Nigeria (*Sampson*); Old Calabar (?); Gambari (*B. Bolton*); Ile-Ife (*J. T. Medler*); Evin-Odo (*J. T. Medler*). CAMEROUN : Mt Cameroun, Bonakande (*M. Steele*); Ntsama (*C. A. Collingwood*); Nkolbisson (*L. G. Segers*). EQUATORIAL GUINEA : Fernando Po (*W. Cooper*). SUDAN : Didinga district, Nagichot (*G. D. H. Carpenter*). CONGO (KINSHASA) : Barumbu (*J. Ghesquiere*); Bas-Uele (*G. F. de Witte*); Bas-Congo, Mayidi (*R. P. Van Eyen*); Bas-Congo, Luki (Mme *Van Alstein*); Bambesa (*H. J. Bredo*); Bambesa (*J. Vrydagh*); Bosanga (*A. Collart*); Bangala, Diobo (*A. Collart*); Albertville (*H. Bomans*); Albertville (*G. Hösli*); Brabanta (*P. Henrard*); Eala (*J. Ghesquiere*); Eala (*H. J. Bredo*); Eala-Bokatola-Bikoro (*P. Staner*); Elizabethville (*Kerkvoorde*) (*A. Allaer*), (*T. D. A. Cockerell*); Equateur, Lukoiela (*R. Deguide*); Haut-Uele, Moto (*L. Burgeon*); Haut-Uele, Watsa (*L. Burgeon*); Haut-Uele, Dika (*H. Schouteden*); Ituri, Kanga-Kilo (*S. Milliau*); Gazi (P. Henrard); Ituri, Matenda (*A. Collart*); Ituri, Uluku (*A. Collart*); Ituri, Okondo (*A. Collart*); Kasai, Ipamu (*P. Vanderijst*); Kasai, Kabi (*M. Poll*); Kasai, Djeka (*R. Roiseux*); Kasai, Luisa, Forêt Kawambo (*M. Poll*); Kinshasa (*A. Tinant*); Katanga, Kando (*R. P. T. de Caters*); Katanga, Katompe (*P. Gerard*); Katanga, Lukafu (*G. F. de Witte*); Katanga, Lubudi (*M. Prinz*); Katanga, Luembe (*R. P. T. de Caters*); Katanga, Busimba (*R. P. T. de Caters*); Katanga, Lufira River (*S. A. Neave*); Dilolo (*J. Ogilvie*); Kivu, Kibate, Masisi (*R. Laurent*); Kivu, Matale (*H. Bomans*), (*R. Laurent*); Kivu, Nzombe (*Froidebise*);

Kwango, Mekwo (*Vleeschouwers*); Kisantu, Mpese (*R. P. Coosemans*); Kwamouth (*Vleeschouwers*), (*G. F. de Witte*); Kikwit (*P. Vanderijst*); Lake Kivu, Rwankwi (*J. V. Leroy*); Luluaborg (*J. J. Deheyn*); Lulua, Luashi (*Freyne*); Lulua, Kapanga (*G. F. Overlaet*); Lualaba, Kolwezi (*L. Gilbert*); Leverville (*J. Tinant*); Mayumbe, Tshenge (*A. Collart*); Mayumbe, Yanga (*A. Collart*); Mayumbe, Binga (*A. Collart*); Mongbwalu (*A. Lepersonne*), (Mme *Scheitz*); Nouvelle-Anvers (*H. Schouteden*); Stanleyville (*A. Collart*); Sankuru, M'Pemba Zeo (*R. Marechal*); Sankuru, Komi (*J. Ghesquiere*); Tshuapa, Bokungu (*Dupuis*); Tshuapa, Flandria (*P. Hulstaert*); Tshuapa, Bokuma (*R. P. Lootens*); Tshuapa, Yolo (*Buckinckx*); Ubangi, Bumba (*J. Eugene*); Uele, Dingila (*H. J. Bredo*); Yambata (*di Giorgi*). UGANDA : Tero Forest (*C. C. Gowdey*); Kawanda (*H. Hargreaves*); Entebbe (*C. C. Gowdey*), (*C. A. Wiggins*); Bugamo Forest (*C. H. Marshall*); Mariba Forest, Chagwa (*C. C. Gowdey*); Kampala, Namirembe Hill (*E. Millar*); West Ankole (*S. A. Neave*); Bwamba (*W. H. R. Lumsden*). KENYA : Taveta Forest (*M. Steele*); Lake Victoria, Kome (*G. D. H. Carpenter*). TANZANIA : Bukoba (*C. C. Gowdey*); Amani (*N. L. H. Krauss*), (*A. W. J. Pomeroy*); Tanga (Arnold coll.) (*G. Arnold*), (*R. C. H. Sweeney*); Dar-es-Salaam (*A. Loveridge*); Moero, Niunzu (*H. de Saeger*); Zanzibar (*M. J. Way*). ZAMBIA : Kipushi (*H. S. Evans*). MALAWI : Nyika Mts (*A. Whyte*).

Also recorded from Guinea, Liberia (type data), Togo, Congo (Brazzaville), and Angola.

Polyrhachis phidias Forel

(Text-figs 8, 42)

Polyrhachis phidias Forel, 1910*a* : 450. Syntype workers, EQUATORIAL AFRICA (locality unknown) (MHN, Geneva) [examined].

Worker. TL 4·9–5·1, HL 1·18–1·26, HW 1·03–1·08, CI 85–87, SL 1·18–1·26, SI 114–116, PW 1·08–1·13, MTL 1·16–1·21. (2 measured.)

Anterior clypeal margin entire, somewhat flattened medially. Sides of head in front of the strongly convex eyes shallowly convex. Behind the eyes the sides are nearly straight and meet the convex occipital margin almost in a right-angle. Alitrunk marginate laterally throughout its length, the marginations broken only at the sutures. Constituent segments of the dorsum of the alitrunk shallowly transversely convex. Pronotum armed with a pair of broad, flattened, triangular spines, the outer edges of which form a continuous convexity with the lateral marginations. Sutures well developed on the dorsum, the metanotal groove impressed. Propodeum armed with a pair of small, blunt, upturned teeth. Petiole with a pair of long, acute, lateral spines and a pair of short, triangular, dorsal teeth. Anterior face of first gastral segment strongly concave medially.

Erect hairs present on all dorsal surfaces of the body, but absent from the antennal scapes. Pubescence short and grey in colour.

Head and dorsum of alitrunk finely longitudinally striate-rugose. The first gastral segment similarly but more finely sculptured and with numerous small punctures between the rugae.

In the original description Forel stated that the locality in which the type series was captured was unknown, although 'certainly in Equatorial Africa'. This last information is also included upon the data labels of the type specimens. The species is definitely a member of the *militaris* group, as is shown by the margination of the

alitrunk and the development of the metanotal groove and petiole. Hung (1967 : 403) states that in the subgenus *Myrma* the metanotal groove is distinct only in some African species and this fact, coupled with those mentioned above prove that Forel was correct in assigning this species to the Ethiopian region. *P. phidias* is most closely related to *fissa* and its immediate allies as is shown by the petiolar structure and the development of the pronotal spines. It differs from them in details of sculpturation and petiolar structure.

The habits of the species are probably similar to those of *fissa* or *decemdentata* and its range probably covers the same area as these two species, that is, the forest zones of West and Central Africa.

Polyrhachis rufipalpis Santschi

(Text-figs 11, 35)

Polyrhachis rufipalpis Santschi, 1909 : 396. Syntype workers, CONGO (BRAZZAVILLE) : Brazzaville (*A. Weiss*) (NM, Basle) [examined].

Polyrhachis rufipalpis subsp. *mayumbensis* Forel, 1913*b* : 358. Holotype worker, CONGO (KINSHASA) : Mayumbe, Kiniati (*R. Mayné*) (MRAC, Tervuren) [examined]. **Syn. n.**

Worker. TL 5·0–5·4, HL 1·26–1·29, HW 1·00–1·04, CI 78–82, SL 1·33–1·48, SI 133–142, PW 0·96–1·00, MTL 1·40–1·48. (7 measured.)

Anterior clypeal margin arcuate and entire. Eyes convex, the sides of the head in front of the eyes more or less straight and somewhat convergent anteriorly. Behind the eyes the sides round into the convex occipital margin. Alitrunk marginate laterally throughout its length, the margination interrupted only at the sutures. Constituent segments of dorsum of alitrunk transversely convex. Pronotum armed with a pair of spines, propodeum with a pair of variable teeth. Usually these are present as a pair of minute, upcurved denticles, but may be reduced to a pair of tubercles or even be absent. In one specimen a minute tubercle is present on one side but absent from the other. Promesonotal suture incised, metanotal groove impressed. In profile the propodeum rises vertically from the metanotal groove, passes through a strongly convex curve dorsally and then slopes backwards to the junction of the dorsum and the declivity. In dorsal view the marginations of the propodeum are slightly divergent posteriorly. Petiole with a blunt process ventrally, armed with four spines, the dorsal pair longer than the laterals, straight, directed slightly outwards and backwards. Lateral pair of spines directed outwards and very slightly upcurved. Anterior face of first gastral segment only very shallowly concave.

Body devoid of erect hairs except upon the anterior clypeal margin and the gastral apex. A fine pubescence present everywhere.

Sculpturation everywhere of a fine reticulation. Colour black, the tibiae lighter, brown to orange-brown, dully shining.

Female as worker apart from the usual differences associated with caste. A recently dealated female was recorded in Ghana in June.

The subspecies *mayumbensis* is a straight synonym of *rufipalpis*. In the original description Forel admitted that he had not seen any material of the species. In fact, the type of *mayumbensis* has rather long propodeal teeth and the lateral pair of petiolar spines are noticeably thicker than the dorsal pair, but in all other respects it is as *rufipalpis*.

A small, arboreal, active species, closest related to *alluaudi*, differing from it in size and details of sculpturation. A solitary female caught in eastern Ghana was

running on a tree trunk with several *fissa* workers. Nests are probably constructed of fibre.

MATERIAL EXAMINED.

GHANA : Tafo (*B. Bolton*); Atewa (*D. Leston*).

Also recorded from Congo (Brazzaville) (type data) and Congo (Kinshasa) (type data).

Polyrhachis schistacea (Gerstaecker)

Hoplomyrmus schistaceus Gerstaecker, 1858 : 262. Holotype worker, MOZAMBIQUE (probably in MNHU, Berlin).

Polyrhachis carinatus F. Smith, 1858 : 71, pl. 4, figs 48, 49. Holotype worker, SOUTH AFRICA : Natal, Durban. [nom. preocc. (not *carinata* Fabricius).]

Polyrhachis rugulosus Mayr, 1862 : 685, pl. 19, fig. 17. Holotype worker, SOUTH AFRICA : Natal, Durban (not Brazil) (probably in NM, Vienna). **Syn. n.**

Polyrhachis schistazeus (Gerstaecker); Mayr, 1863 : 446 [misspelling].

Polyrhachis militaris st. *cafrorum* Forel, 1879 : 120. Syntype workers, ♀, ♂, SOUTH AFRICA : Transvaal, Valdezia (*M. Berthoud*) (probably in MHN, Geneva).

Polyrhachis schistacea var. *divina* Forel, 1913*c* : 348. Syntype workers, TANZANIA : Pemba Is. (probably in MHN, Geneva). **Syn. n.**

Polyrhachis schistacea var. *divinoides* Forel, 1913c : 348. Syntype workers, CONGO (KINSHASA) : Katanga, Sankisia (*J. Bequaert*) (probably in MHN, Geneva). **Syn. n.**

Polyrhachis schistacea subsp. *atrociliata* Santschi, 1914*a* : 141. Syntype workers, UGANDA : Ibanda, foothills of Ruwenzori Mts, 1400 m, 1909 (*Alluaud* et *Jeannel*) (MRAC, Tervuren). **Syn. n.**

Polyrhachis schistacea subsp. *atrociliata* var. *benguelensis* Santschi, 1914*a* : 141. Holotype worker, ANGOLA : Benguela, Ubanghi (NM, Basle) [examined]. [Name not available.]

Polyrhachis schistacea subsp. *fracta* Santschi, 1914*a* : 141. Holotype worker, KENYA : Fort Hall, 1330 m, i.1912 (*Alluaud* et *Jeannel*) (probably in NM, Basle). **Syn. n.**

Polyrhachis schistacea subsp. *fracta* var. *subplana* Santschi, 1914*a* : 142. Holotype worker, KENYA : Gazi, xi.1911 (*Alluaud* et *Jeannel*) (NM, Basle) [*examined*]. [Name not available.]

Polyrhachis schistacea var. *gagatoides* Santschi, 1914*a* : 142 [in key]. Syntype workers, CONGO (BRAZZAVILLE) (*A. Weiss*) (NM, Basle) [examined]. **Syn. n.**

Polyrhachis schistacea subsp. *atrociliata* var. *mediopilosa* Santschi, 1923 : 295. Holotype worker, CONGO (KINSHASA) : Irumu (*J. Bequaert*) (NM, Basle) [examined]. [Name not available.]

Worker. TL 9·3–13·7, HL 2·15–2·78, HW 1·63–2·26, CI 76–80, SL 2·78–3·40, SI 141–170, PW 1·29–1·89, MTL 3·07–3·89. (30 measured.)

Anterior clypeal margin entire. In profile the clypeus is usually convex above and concave below, the anterior margin projecting as a weak shelf over the basal borders of the mandibles. Eyes virtually flat to strongly convex; the sides of the head in front of the eyes gently convex, occipital margin distinctly so. Alitrunk marginate throughout its length, the marginations sharp but not flange-like or lamellate, nor distinctly projecting upwards or outwards from the dorsum; interrupted at the sutures. Pronotal spines long and acute, usually with a narrow base. Propodeal teeth of variable length, usually small and upcurved. Pronotal suture distinct; metanotal groove impressed. Petiole with a pair of long dorsal spines and a pair of laterally placed teeth.

Erect hairs numerous, usually present on all surfaces, always present on the side of the head between the eye and the ventrolateral border and on the mesonotal and propodeal dorsa. Colour of hairs varies from white to black. Pubescence usually greyish and dense but never so

dense as to mask the underlying sculpturation. In some the pubescence is very much reduced.

Sculpture variable, may be of a fine reticulo-rugulation, a disoriented mass of small rugae, or a fine dense longitudinal rugulation on the dorsal surfaces of the head and alitrunk. Gastral sculpturation varying from finely reticulate to finely reticulate-punctate. If the gaster is finely reticulate the rims of the reticulae are raised and not merely superficial as in *gagates*. Colour uniform black, or with the legs black-brown. Usually dull, occasionally with the gaster polished.

Female answers to the above description with the usual differences associated with this caste. Alate females have been recorded as follows, UGANDA : August, November. KENYA: February. MALAWI : March. RHODESIA : January.

Most of the synonyms tabulated above are very straightforward, the respective subspecies and varieties being founded on hair colour, density of pilosity, intensity of sculpturation or differences in sculptural details, convexity of eyes, or on size and relative proportions of constituent parts of the alitrunk. The present study has shown these to be gradient factors, at times even with variation in the same nest series. In the specimen of *fracta* examined (det. Santschi, from Nyanza) the eyes are flattened and the gaster rather polished, but otherwise the specimen is a very ordinary *schistacea*, as is its var. *subplana* which is rather more hairy and less shining than *fracta*.

Santschi (1914*a* : 142) presented a key to the then described forms of *schistacea* and in the first couplet he indicated that he was aware that with eye shape he was not dealing with a distinct and constant difference but with a variable character. The couplet (translated) states:

1. Eyes convex. . . .

–. Eyes flat or nearly flat. . . .

At the present time a series of specimens can be constructed showing almost all intergrades in eye convexity from nearly flat through to strongly convex, and the same applies to all the other characters noted above as variable except for hair colour, which seems to be constant at least in a given nest series.

As has been pointed out in the discussion of *gagates*, Forel (1913*b* : 357) was of the opinion that *gagates* and *schistacea* were probably synonymous and was supported in this view by Wheeler (1922*a* : 260) who considered that the large species comprising the *militaris* complex were, 'so variable and exhibit so many annectant subspecies and varieties that one is tempted to regard the whole complex as a single, extraordinarily unstable species'.

Santschi (1914*a* : 143) took an opposing line and asked if the numerous intermediate varieties noted in the three species were not simply hybridisation phenomena between closely related groups.

It became obvious during the course of the present survey that the infraspecific forms could be satisfactorily incorporated in one or another of the species concerned and this has lead to the definition of the species rather more accurately. Further work may show that the Forel-Wheeler view is correct in some cases, but at the present time the amount of material required to complete such an investigation has not been amassed. On the other hand, hybridisation is not the complete answer either, as only a single specimen which could possibly be called a hybrid has been

seen during the course of this study (see under *gagates*) but even this specimen could be assigned to a definite species.

P. schistacea is a common savannah and scrub forest species which ranges from Sudan to South Africa and from the east to the west coasts of the continent south of the Sahara, but it is absent from rain forest, where it is apparently replaced by *militaris*. Nests are constructed in the earth either in open ground where a crater is formed around the entrance, or under stones. More rarely the species nests in or under decayed wood. Foraging is carried out on the surface of the ground, on grass stems and on low bushes. Arnold (1924 : 745) states that the entrance to the nest, when made directly into the ground is 'surrounded by an irregular, cup-like wall about one to one and a half inches high, made of woven pieces of grass blades'. He also notes that the ant tends aphids and coccids, one of the few food records for the genus in the Ethiopian region.

MATERIAL EXAMINED.

SIERRA LEONE : specimen without further data. IVORY COAST : Bouake (*G. Schmitz*). TOGO : Agou (*Y. Schach*). NIGERIA : Ogbomosho (*B. Bolton*); Obudu (*J. T. Medler*). SUDAN : Imatong Mts (*N. A. Weber*); Torit (*W. T. R. L.*). ETHIOPIA Didessa River (*K. M. Guichard*). UGANDA : Ibanda (*Ch. Alluaud*); Nakanyonyi (*E. Millar*); Kawanda (*G. H. E. Hopkins*); Entebbe (*S. A. Neave*), (*C. C. Gowdey*); Bundibugyo (*D. S. Fletcher*); between Seziwa and Kampala (*S. A. Neave*). RWANDA, BURUNDI : Nyanza (?); Kibungu (*R. Verhulst*). KENYA : Ngabana (*Gregory*); Gazi (*Ch. Alluaud*); Miongave (*L. F. Brown*); Diani Beach (*N. L. H. Krauss*); Narossura River (*W. P. Lowe*); Simba (*S. A. Neave*); Mombasa (*S. A. Neave*). TANZANIA : Tembwe (*H. Schouteden*); Mpala (*H. Bomans*); Moero, Niunzu (*H. de Saeger*); Zanzibar, Chakwa (*E. S. Brown*); Zanzibar, Chukwani (*E. S. Brown*); Uvira (*J. Ogilvie*); Ngoga (*A. Loveridge*). MALAWI : Mombera Dist. (*S. A. Neave*); Masuku Mts, 6000–7000 ft (*A. Whyte*); Mlanje (*S. A. Neave*); Fort Johnston (*P. Rendall*); Nyika Mts (*A. Whyte*); between Fort Mangoche and Chikala Boma (*S. A. Neave*); Ruo Valley (*S. A. Neave*). GABON : Libreville (*A. Tinant*). CONGO (BRAZZAVILLE) : Brazzaville (*A. Weiss*), (*L. Detaille*). CONGO (KINSHASA) : Bas-Congo, Lemfu (*P. de Beir*); Bas-Congo, Moanda (*E. Dartevelle*); Bas-Congo, Bateke-Nord (*R. C. Eloy*); Costermansville (*P. H. Vercammen*); Haut-Uele, Paulis (*P. L. G. Benoit*); Inkongo, Lusambo (*Wilson*); Haut-Uele, Moto (*L. Burgeon*); Haut-Uele, Watsa (*L. Burgeon*); Haut-Uele, Mauda (*H. Schouteden*); Ituri, Faradje (*A. Collart*); Ituri, Mahagi (*H. Schouteden*); Ituri, Caporata (*L. Burgeon*); Ituri, Moibe, Sesenge (*A. Collart*); Ituri, Lisasi (*Van Canneyt*); Ituri, Fôret de Kawa (*A. Collart*); Ituri, Kwambe (*A. Collart*); Ituri, Bunia (*J. V. Leroy*); Jadotville (*R. P. T. de Caters*); Katanga, Lubueli (*M. Prinz*); Katanga, Kabalo (*H. Schouteden*); Katanga, Kiambi (*G. F. de Witte*); Katanga (*A. Bayet*); Katanga, Mwema (*A. Bayet*); Katanga, Pweto (*A. Bayet*); Katanga, Lufira River (*S. A. Neave*); Katanga, Dilolo (*A. Mackie*); Kunungu (*H. Schouteden*); Kasongo, Lupaya (*P. L. G. Benoit*); Kasongo, Komato (*P. L. G. Benoit*); Kasai, Ipamu (*P. Vanderijst*); Kasai, Tshikapa (*Fourche*); Kikwit (*P. Vanderijst*); Kibali-Ituri, Geti (*C. Scops*); Kivu, Buseregenye (*E. Luja*); Kivu,

Uvira (*G. Marlier*); Kamina (*A. Buls*); Kabalo (*L. Ogilvie*); Kambove (*S. A. Neave*); Leopoldville (*A. Tinant*); Luluaborg (*A. Francois*), (*J. van Hutuelde*); Lomami, Kamina (*Bernard*); Mahagi, Niarembe (*C. Scops*); Mayidi (*P. Van Eyen*); Mayema (*R. Mayne*); Mayumbe, Tshiobo-N'Goy (*A. Collart*); Rutshuru (*L. Lippens*); Sankuru, Gandaljika (*P. de Franquen*); Stanleyville (*A. Collart*); Sakonia (*J. Ogilvie*); Thysville (*P. Basilewsky*); Uele, Pawa (*A. Dubois*); Urundi, Usumbura (*H. Schouteden*); Vuhovi (*H. J. Bredo*); Vista (*A. T. Marée*). RHODESIA : Lochimvar (*F. van Noten*); Bulawayo (*G. Arnold*); Matoppos (*G. Arnold*); Sawmills (*G. Arnold*); Inyanga (*G. Arnold*). MOZAMBIQUE : Beira (*L. F. Brown*); Delagoa Bay (*R. E. Turner*). ANGOLA : Luanda (*Gradwell* and *Snow*); Cabinda (*P. Allaer*). SOUTH AFRICA : Natal, Zululand, Nagana Research Lab. (*H. H. Curson*); Natal, Durban (*F. W. B. Marley*), (*C. B. Cooper*), (*F. Muir*); Amanzimtoti (*T. D. A. Cockerell*); Pretoria (*W. L. Distant*); Natal, Umgeni (*C. P. V. D. Merwe*); Transvaal (*G. Mayr* coll.); Wonderboom (*T. D. A. Cockerell*); Morebank (*A. Mackie*).

Also recorded from Guinea, Cameroun and Somali Republic.

Polyrhachis schlueteri Forel

Polyrhachis militaris st. *schlüteri* Forel, 1886 : 195. Holotype worker, EAST AFRICA (*Schlüter*) (MHN, Geneva).

Polyrhachis schlüteri Forel; Forel, 1907*b* : 92.

Polyrhachis schlüteri var. *indigens* Forel, 1914 : 261. Syntype workers, SOUTH AFRICA : Natal, Durban (*G. Arnold*) (probably in MHN, Geneva).

Polyrhachis schlüteri var. *plebeia* Santschi, 1914*a* : 143. Holotype worker, KENYA : Taveta, 750 m, iii.1912 (*Alluaud* and *Jeannel*) (probably in NM, Basle). **Syn. n.**

Worker. TL 8·6–9·1, HL 2·00–2·23, HW 1·66–1·78, CI 79–85, SL 2·25–2·60, SI 142–149, PW 1·54–1·78, MTL 2·49–2·60. (15 measured).

Anterior clypeal margin arcuate and entire to weakly and shallowly impressed in the middle. Eyes strongly convex, situated well back on the sides of the head, which are slightly convex both in front of and behind the eyes. Behind the eyes the sides rounding gently into the weakly convex occipital margin. The shape of the head and placement of the eyes gives the ant a very long-faced appearance. Alitrunk marginate laterally throughout the length of the sides. Pronotal spines large, their outer borders continuous with the line of margination of the segment, not passing through an angle between the pronotum and the body of the spine. Propodeum with a pair of small, blunt tubercles. Promesonotal suture and metanotal groove distinct, the latter impressed. Petiole with a pair of strong dorsal spines subtended by a pair of laterally placed, broad, acute teeth. Anterior face of first gastral segment concave.

Erect hairs absent from all dorsal surfaces except the anterior clypeal margin and gastral apex. Pubescence extremely dense everywhere, hiding the sculpture and silver-grey in colour.

Sculpture everywhere of a fine, dense reticulation. Colour black, the legs usually brown-black. Whole insect with a silvery appearance in life due to the dense pubescence.

Female. As worker apart from the usual modifications associated with the alitrunk. Alates have been recorded as follows: TANZANIA: August. S. AFRICA: January.

The variety *indigens* was reduced to a synonym by Arnold (1924 : 747) who noted that the pubescence of the variety was supposedly less brilliant, but that this was an artifact brought about by the immersion of the specimens in spirits of wine which to a great extent had destroyed the colour. Santschi's variety *plebeia* was founded

on a single worker with minor differences in the curvature of the upper pair of petiolar spines and the development of the lateral teeth, which are in all probability individual variations as some variability in these characters can be seen in series from the vicinity of Durban, Natal.

Related to the *militaris* complex of species, from which *schlueteri* is very easily separated by the absence of standing hairs on the dorsum of the head, alitrunk and gaster and by the dense silver-grey pubescence.

Arnold (1924 : 748) states that the species is limited to hot and moist localities, but otherwise nothing has been reported on the habits of this species.

MATERIAL EXAMINED.

TANZANIA : Handeni (*W. A. Lamborn*). SOUTH AFRICA : Natal, Durban (*G. Arnold*), (*F. Muir*), (*H. B. Marley*).

Also recorded from Kenya (type data) and Mozambique.

Polyrhachis sulcata E. André

(Text-figs 43, 62)

Polyrhachis sulcata E. André, 1895 : 1. Holotype ♀, CONGO (BRAZZAVILLE) : Ogowe (probably in MNHN, Paris).

Worker (previously undescribed). TL 7·8–9·2, HL 1·89–2·07, HW 1·52–1·67, CI 78–80, SL 2·18–2·24, SI 134–143, PW 1·29–1·37, MTL 2·29–2·48. (6 measured.)

Anterior clypeal margin arcuate, entire; the clypeal suture forming a distinct break in the sculpture. Sides of head weakly convex in front of the strongly protuberant eyes, convex and converging behind the eyes. Lateroventral margins of head concave. Frontal carinae with strongly sinuate, laminate lobes. Sides of pronotum and mesonotum marginate, propodeum immarginate, the sides rounding into the dorsum. Pronotum armed with a pair of spines, the propodeum with a pair of spines which curve upwards and outwards and are somewhat longer than those of the pronotum. Propodeum also with a pair of small triangular prominences anterolaterally, just posterior to the impressed metanotal groove. Petiole with a pair of long, acute, almost parallel dorsal spines and a pair of shorter, upcurved lateral spines. Anterior face of first gastral segment vertical, not concave.

Off-white to yellowish white erect hairs present on all surfaces of body and appendages, most dense on the legs, antennal scapes and the gaster. Pubescence virtually absent, distinctive only on the funiculi and tarsal segments, sparse on the scapes and the remainder of the legs and completely absent from the dorsum of the alitrunk.

Sculpture of head, alitrunk, petiole and gaster of very deep, regularly spaced striae, the areas between them strongly convex so that the surface has a ploughed appearance. In direction they are longitudinal on the head, pronotal, mesonotal and gastral dorsa and on the pronotum and gaster laterally; transverse on the propodeal declivity, posterior face of the scale and anterior face of the gaster, and oblique on the mesopleuron, metapleuron and sides of the propodeum. On the propodeal dorsum the striae are V-shaped dorsally.

Colour black, with the apical margins of the mandibles sometimes lighter, brown or yellow-brown. The tips of the apical funicular segments, palpi, and apices of the pretarsi yellow or dull yellow-brown. The eyes of one worker are white, but this is an artifact common in stored *Polyrhachis* specimens.

Female agreeing with the above description except for the following points which are noted by André in the original description of the female:

1. Erect hairs dirty yellow. This colouration would appear to fall well within the range of the species, as is noted above.

2. Striae transversely arched on pronotum. In the worker the striae are longitudinal; the transverse direction in the female may be accounted for by the foreshortening of this segment in the queen caste, as is seen in other species with similar sculpturation (e.g. *latispina*).

This distinctive and beautiful species is known only from the female holotype and the two collections made more recently in Ghana, as noted below. Both these collections were made by pyrethrum knock-down in areas reasonably well-collected by methods which were more normal but which had failed to produce this species. This seems to indicate that *sulcata* is an arboreal form which hardly, if ever, descends to ground level. Its affinities definitely lie with the *militaris* group of species but it is easily separated from the other constituent species by the lack of propodeal margination and the unique sculpturation.

MATERIAL EXAMINED.

GHANA : Kade (*D. Leston*); Bunso (*D. Leston*).

Also recorded from Congo (Brazzaville) (type data).

Polyrhachis wellmani Forel

(Text-fig. 23)

Polyrhachis wellmani Forel, 1909 : 68. Syntype workers, ANGOLA : Benguela (*C. Wellman*) (MHN, Geneva) [examined].

Worker. Tl 8·3–8·7, HL 2·22–2·37, HW 1·74–1·85, CI 78, SL 2·74–2·81, SI 152–157, PW 1·40–1·48, MTL 2·92–3·00. (3 measured.)

Very similar to *schistacea*. Clypeus with a more or less distinct, truncate lobe, the anterior margin of which has numerous notches from which stout hairs arise. Eyes convex; sides of head in front of eyes convex. Alitrunk marginate laterally throughout its length, interrupted at the sutures. Pronotum armed with a pair of long spines, propodeum with a pair of short, thick upcurved teeth. Promesonotal suture distinct; metanotal groove impressed. Petiole with only a single pair of spines, situated at the dorsolateral angles of the segment. The lateral pair completely absent. Anterior face of first gastral segment shallowly concave.

Entire body with numerous erect yellow-white or off-white hairs and a long, dense pubescence which in part hides the sculpturation, especially on the dorsum of the alitrunk.

Head with a fine longitudinal rugulation overlying a fine reticulo-puncturation. Dorsum of alitrunk similarly sculptured but with the puncto-reticulate part of the sculpturation more distinct on the pronotum than on the following segments on which the longitudinal rugulation predominates. Gaster finely and densely reticulate-punctate.

This species is so closely related to *schistacea* that it would have been synonymised had it not been for a single character which appears to be consistent, namely the lack of lateral petiolar teeth. In size *wellmani* lies towards the lower end of the *schistacea* range and it may be that a more detailed investigation of smaller *schistacea* specimens will show a gradual diminution of the lateral petiolar teeth until a *wellmani*-like condition is reached. Suffice to say that during the present investigation all small *schistacea* specimens retained the lateral petiolar teeth whilst in the present species they were completely absent.

Habits of this species unknown, but probably as *schistacea*.

MATERIAL EXAMINED.

CONGO (KINSHASA) : Katanga, Kansenia (*G. F. de Witte*).

Also recorded from Angola (type data).

THE *VISCOSA*-GROUP

This group of species is closely related to, and has probably developed from, the *militaris*-group. The characteristics of the group include the reduction of the sutures of the alitrunk to faint, non-impressed lines and a reduction in the intensity of the lateral margination of the alitrunk, which in the present group of species is represented only by a low ridge or an acute angle and not as a projecting rim or flange as is so often seen in the *militaris*-group. The basic sculpturation consists of a fine, dense, reticulate-puncturation which is usually overlaid on the head and alitrunk by a loose rugoreticulum. In *arnoldi*, however, the ground sculpturation is overlaid and very much replaced by a fine, dense longitudinal striation which extends on to the gaster.

An interesting character found in this group is the development in many of its species of a transverse ridge running across the propodeum between the propodeal teeth or spines, and effectively separating the dorsum from the declivity. The development of the character is variable; for instance in *nigrita* it is absent, in *spinicola* present, but in most species in which the ridge occurs it is raised medially into a blunt tooth or tubercle, best developed in *cubaensis*. The presence of a distinct, transverse propodeal ridge is noticeable in some species of other groups, namely *latispina* of the *militaris*-group and *lestoni* and *limitis* of the *alexisi*-group.

Viscosa and related species are virtually devoid of erect hairs. In all species of the group hairs are restricted to the anterior clypeal margin and the gastral apex and only occasionally is a pair of hairs developed upon the dorsum of the head or alitrunk.

The petiolar structure in the group parallels that of the *militaris* group. The usual form is similar to that found in species closely related to *fissa*, with the dorsal and lateral spines of approximately equal length, but there is a tendency towards the lengthening of the dorsal pair, best seen in *durbanensis*.

Two species, *nigrita* and *viscosa*, show an increasing development of the lateral spines at the expense of the dorsals. As the laterals increase in size they tend to occupy the dorsolateral corners of the petiole so that the dorsal pair come to project from an almost flat surface running between the lateral spines. In *viscosa* the dorsals are still spiniform and a short but strongly sloping surface separates them from the laterals, but in *nigrita* the dorsals are reduced to a pair of teeth projecting from the almost flat surface between the very large lateral spines.

All members of the group are restricted in distribution to savannah and veldt regions; none have been recorded from the forests of West and Central Africa.

Polyrhachis arnoldi Forel

(Text-figs 27, 63)

Polyrhachis arnoldi Forel, 1914 : 263. Holotype worker, SOUTH AFRICA : Natal, Durban (*G. Arnold*) (MHN, Geneva).

Worker. TL 7·0–8·1, HL 1·74–1·89, HW 1·48–1·56, CI 82–85, SL 1·85–1·93, SI 123·125, PW 1·33–1·37, MTL 1·92–2·00. (7 measured.)

Anterior margin of the clypeus with a small median emargination. Sides of head in front of the eyes more or less straight, weakly convergent; occipital margin strongly convex. Eyes weakly convex. Alitrunk marginate throughout its length, the sides converging posteriorly so that the pronotum is notably broader than the propodeum. Pronotum bispinose; propodeum armed with a pair of short, upcurved teeth between which runs a transverse carina separating the dorsum from the declivity. The central portion of this carina is raised and appears as a prominence or blunt tooth in profile. Promesonotal suture and metanotal groove poorly developed, the former weak but distinct, the track of the latter indicated only by a break in the sculpturation. Both are transverse and are very little arched. Petiole with four spines of approximately equal length, the lateral pair somewhat more stout than the dorsal. Middle of anterior face of first gastral segment concave and accommodating the posterior face of the petiole.

Erect hairs present only on mandibles, anterior margin of clypeus and apex of gaster. All dorsal surfaces without erect hairs; pubescence developed only on the appendages.

Sculpturation of clypeus a fine, superficial reticulation with scattered, very shallow pits. Head between eye and antennal insertion reticulate, rest of dorsum of head finely, longitudinally striate. Dorsum of alitrunk and first gastral segment finely and densely longitudinally striate, the second gastral segment very finely reticulate. Alitrunk laterally and anterior face of petiole finely rugulose. Colour black, dully shining; the legs usually brown-black, the palpi yellow-brown.

P. arnoldi appears to be an uncommon species, related to *cubaensis* and *spinicola*, from which it is most easily separated by the form of the sculpturation. In related species the sculpturation is mainly of a fine reticulate-rugulation with punctate or reticulate-punctate interspaces.

Arnold (1924 : 751) states that, 'the only nest found was made in a shallow concavity on the vertical trunk of a tree, the hollow being covered by a more or less circular lid, about $2\frac{1}{2}$ inches in diameter, made of a very closely woven silky web in which were embedded particles of bark and dirt'.

In this respect the nest resembles those of *otleti* found in secondary forest or cultivated land in West Africa.

MATERIAL EXAMINED.

MALAWI : Mlanje Boma (*S. A. Neave*). SOUTH AFRICA : Natal, Durban (*G. Arnold*); Natal, Durban (*F. B. Marley*).

Polyrhachis cubaensis Mayr

Polyrhachis cubaensis Mayr, 1862 : 686. Holotype worker, SOUTH AFRICA : Natal, Durban (not Cuba) (probably in NM, Vienna).

Polyrhachis gerstaeckeri Forel, 1886 : 197. Holotype worker, TANZANIA : Zanzibar (*Hildebrandt*) (probably in MHN, Geneva). **Syn. n.**

Polyrhachis cubaensis var. *striolatorugosa* Mayr, 1893 : 195. Holotype worker, TANZANIA : Zanzibar (probably in NM, Vienna). **Syn. n.**

Polyrhachis cubaensis subsp. *wilmsi* Forel, 1910*b* : 30. Holotype worker, MOZAMBIQUE : Lobombo Borges (*F. Wilms*) (probably in MHN, Geneva). **Syn. n.**

Worker. TL 6·4–7·5, HL 1·77–1·85, HW 1·59–1·67, CI 89–91, SL 1·75–1·88, SI 110–113, PW 1·33–1·41, MTL 1·85–1·93. (4 measured.)

Anterior clypeal margin entire, somewhat truncated medially and with a pair of notch-like pits from which long hairs arise. In profile the slope of the clypeus is suddenly less steep towards the anterior margin and this area is rather more convex than the rest of the clypeus. Eyes convex. The head broadly convex behind, the sides of the head in front of the eyes gently convex and convergent. Alitrunk marginate throughout its length, the dorsal surfaces transversely convex; the propodeal dorsum usually strongly convex medially and with the margination somewhat projecting. Pronotum armed with a pair of broad spines. Promesonotal suture and metanotal groove represented by incised lines; the former better developed than the latter which may in places fail to break the sculpturation. Propodeum with a pair of upcurved spines of variable length and thickness. Between these spines and separating the propodeal dorsum from the declivity runs a transverse ridge, the centre of which is raised up into a median eminence, tubercle or tooth. The size of this eminence is variable and may be small in some individuals, but the ridge is always present and distinct. Petiole with four spines of approximately equal size, the dorsal pair directed upwards and recurved over the base of the gaster; the lateral pair directed outwards and somewhat upwards. Anterior face of the first gastral segment shallowly concave.

Erect hairs present on the clypeus and usually with a double row running between the frontal carinae and on to the vertex. Gaster with hairs usually on the second to last tergite, but absent from the first. A fine, sparse, greyish pubescence present, especially on the appendages, gaster and lateral alitrunk.

Clypeus finely reticulate. Head finely longitudinally rugose, the rugae on the vertex fanning out from the space between the frontal carinae. Sculpturation of the dorsal alitrunk usually of fine longitudinal rugae overlying a fine, dense reticulate-puncturation. The rugae are usually most distinctly longitudinal in the middle of each segment and tend to a fine rugoreticulum laterally; this is especially true of the pronotum. Gaster finely and densely reticulate. The intensity of sculpturation varies. In some the longitudinal rugae may be sharp and distinct, in others low and rounded. Colour black; the legs usually dark brown but may be lighter or almost black.

In the short original description of this species Mayr gave the type locality as Cuba. He corrected this (Mayr, 1893 : 195, footnote) and pointed out that the type locality was in fact Durban. Arnold (1924 : 752) explains that the inappropriate specific name was due to a mixing of labels.

The extensive description of *striolatorugosa* makes up for the brevity of the original description of the species and in fact does not really give any reasons as to why the two forms should be separated. The present author assumes that Mayr took the opportunity of a slightly different specimen to provide a more accurate description of the species as a whole. In the same paper Mayr (1893 : 196) points out that *gerstaeckeri* is best treated as a variety of *cubaensis* but the slight sculptural differences used to separate the two are variable and the names are best treated as synonyms.

Arnold (1924 : 753) records the species nesting 'in hollow stem galls, the walls of the gall partly covered with a web'.

MATERIAL EXAMINED.

SOUTH AFRICA : Zululand (*G. Arnold*).

Also recorded from Mozambique (type data), and Tanzania (type data).

Polyrhachis durbanensis Forel **stat. n.**

(Text-figs 12, 30)

Polyrhachis cubaensis race *durbanensis* Forel, 1914 : 262. Syntype workers, ♀, SOUTH AFRICA : Natal, Durban (*C. B. Cooper*) (MHN, Geneva) [examined].

Worker. TL 6·7–7·3, HL 1·59–1·70, HW 1·29–1·37, CI 80–84, SL 1·64–1·70, SI 123–124, PW 1·03–1·08, MTL 1·74–1·85. (6 measured.)

Anterior clypeal margin arcuate and entire. Eyes convex; the sides of the head in front of the eyes gently convex and convergent anteriorly, behind the eyes convex and rounding into the broadly convex occipital margin. Alitrunk with dorsum transversely convex, marginate throughout its length. Pronotum armed with a pair of short, broad, acute spines. Promesonotal suture distinct, metanotal groove very faint, interrupting the sculpturation. Marginations of propodeum virtually parallel in dorsal view, terminating in a pair of very small, upcurved, tubercle-like teeth. Propodeal dorsum meeting the declivity between these teeth at an acute angle but without a transverse ridge or median tubercle. Petiole with two pairs of spines of variable configuration. Usually the long dorsal pair are directed upwards and recurved backwards, the shorter lateral pair directed outwards, weakly backwards, and somewhat upcurved. Anterior face of first gastral segment shallowly concave.

Erect hairs absent except on clypeus and gastral apex; sometimes a single pair present on the vertex. A very sparse, fine, greyish pubescence present, densest on the antennae.

Clypeus finely reticulate. Head finely and densely reticulate-punctate, overlaid by a fine loose rugoreticulum, most easily visible in the space separating the eye and the frontal carina. Dorsum of alitrunk and gaster finely reticulate-punctate, the former with a few fine, disorganised rugae overlying the punctures, generally best seen on the mesonotum.

Female as worker except for differences generally associated with this caste; the pronotal spines and the propodeal teeth reduced to acute angles.

The original description of *cubaensis* was very short, mostly a discussion of the sculpturation with very little mention of morphological details. Mayr (1893 : 195) realised this and gave a full description under var. *striolatorugosa*, which was however published in a rather obscure journal. When describing *durbanensis* as a race of *cubaensis*, Forel obviously used only the original description and was not aware of, or overlooked Mayr's later paper, or he would have noticed the morphological differences between the two forms. As it was, his description occupied only few lines. Arnold (1924 : 753) recognised the paucity of this description and proceeded to redescribe *durbanensis* in more detail, but although he notes Mayr's publication of 1893 he gives a copy of the original and inferior description. If the two later descriptions (Mayr, 1893 and Arnold, 1924) had been compared then the differences between *cubaensis* and *durbanensis* would have been recognised, and the race would have been raised to specific status long ago.

The species has been found inside the hollow stems of reeds, but whether this also constitutes the nest site is not known.

MATERIAL EXAMINED.

SOUTH AFRICA : Natal, Durban (*C. B. Cooper*).

Polyrhachis nigrita Mayr

(Text-figs 14, 40)

Polyrhachis nigrita Mayr, 1895 : 153. Holotype worker, GHANA : Chama (*Brauns*) (probably in NM, Vienna).

Polyrhachis schoutedeni Santschi, 1919 : 249. Holotype worker, CONGO (KINSHASA) : Dolo, xi.1912 (*F. Chaltin*) (MRAC, Tervuren) [examined]. **Syn. n.**

Worker. TL 7·0–8·9, HL 1·70–2·04, HW 1·48–1·70, CI 83–87, SL 1·89–2·22, SI 130–134, PW 1·15–1·34, MTL 1·92–2·37. (6 measured.)

Clypeus usually with the anterior margin slightly raised, may be weakly emarginate. Eyes convex; occipital margin strongly convex. Antennal scapes broadening apically, about two or three times broader at the apex than at the base but not distinctly and abruptly thickened apically as in *viscosa*. Alitrunk marginate throughout its length, the marginations only poorly developed. Pronotal and propodeal spines well developed, the latter without a transverse ridge running between them, the dorsum rounding evenly into the declivity. Promesonotal suture distinct, metanotal groove represented by a weakly incised line which in places fails to break the sculpturation. Petiole with the lateral pair of spines long and strong, produced outwards and upwards and curved backwards around the base of the gaster. Between these spines are a pair of short teeth, which may be reduced to blunt tubercles. Anterior face of the first gastral segment concave.

Development of erect hairs variable. In smaller specimens a few hairs are present on the anterior clypeal margin and the gastral apex only, but in larger individuals a few may also be present on the dorsum of the head and the alitrunk. Pubescence greyish white, sparse, densest on gaster and sides of alitrunk.

Clypeus with extremely fine longitudinal striae, contrasting to the rest of the head which has a fine reticulate-rugulation, the spaces enclosed by the reticulae finely punctate. A similar sculpturation is found on the dorsum of the alitrunk but laterally the rugae are effaced, leaving the surface finely reticulate-punctate. Gaster minutely and densely reticulate-punctate.

The general body form allies this species to *viscosa* and *cubaensis* as was pointed out by Mayr in the original description. The species is distinguished by the marked reduction of the dorsal pair of petiolar spines and the lack of a transverse ridge separating the propodeal dorsum from the declivity.

The name *schoutedeni* was applied by Santschi to a very small individual of this species. Apart from its small size, which suggests that it may have come from a young colony, it does not differ from *nigrita* in any way. The dimensions of the type specimen of *schoutedeni* are as follows, TL 5·9, HL 1·52, HW 1·33, CI 87, SL 1·70, SI 128, PW 1·00, MTL 1·85.

Probably a ground nesting species which forages on low vegetation as the specimens from Uganda studied during the course of this survey were obtained by sweeping in a marsh. Wheeler (1922*a* : 267) states that a single worker from Akenge, Congo (Kinshasa) was taken from the stomach of a toad.

MATERIAL EXAMINED.

UGANDA : Serere (*J. Ford*).

Also recorded from Ghana (type data), and Congo (Kinshasa) (type data).

Polyrhachis spinicola Forel

Polyrhachis spinicola Forel, 1894 : 70. Syntype workers, ♀, MOZAMBIQUE : Delagoa Bay (*Junod*) (MHN, Geneva).

Polyrhachis cubaensis subsp. *gallicola* Forel, 1894 : 71. Syntype workers, ♀, MOZAMBIQUE : Delagoa Bay (*Liengme*) (MHN, Geneva) [examined]. **Syn. n.**

Worker. TL 6·1–7·0, HL 1·62–1·78, HW 1·33–1·48, CI 82–86, SL 1·70–1·78, SI 120–127, PW 1·11–1·24, MTL 1·72–1·75. (15 measured.)

Anterior clypeal margin arcuate and entire. Eyes hemispherical, weakly to strongly protuberant. Sides of head in front of eyes convex and convergent anteriorly. Alitrunk marginate throughout its length, with a distinct transverse carina or ridge separating the dorsum of the propodeum from the declivity. Pronotum bispinose; propodeum with a pair of spines or teeth which are curved outwards in dorsal view. Declivity of propodeum strongly concave. Promesonotal suture weakly arched, poorly developed; metanotal groove very weakly developed, represented only by a line which breaks the sculpturation. Petiole armed with four spines of variable length, usually with the dorsal pair slightly longer than the lateral, but sometimes of about the same length. Spines curved over and around the base of the first gastral segment which is concave in the middle of its anterior face.

Erect hairs absent from all dorsal surfaces of the body except for the anterior portion of the clypeus and the apex of the gaster. Pubescence weakly developed, most distinct on the legs and antennae.

Clypeus finely reticulate; dorsum of head finely reticulate-rugose, the interspaces reticulate-punctate. Sculpturation of dorsum of alitrunk similar to that of the head but varying in intensity. In a series from the same nest the pronotal sculpturation varies from finely and densely punctate with a weak overlying longitudinal rugulation to distinctly reticulate-rugose with punctate interspaces. The rugulation is usually noticeably more coarse on the mesonotal and propodeal dorsa than on the pronotal dorsum. Declivity of propodeum superficially reticulate and smooth. Gaster finely and densely reticulate-punctate. Colour black, with femora, tibiae and apices of tarsal segments red-brown or yellow-brown. Antennae usually brown-black at the bases of the funiculi but tending to become deep red-brown apically.

Female answering to the above description except in the development of the alitrunk and in the following respects; dorsal pair of petiolar spines often strongly recurved posteriorly at their apices and somewhat hook-like. All forms occur between the usual worker pattern and a distinct small hook. Sculpturation of the mesoscutal dorsum may be reduced to fine, dense, longitudinal striae with interstitial reticulate-puncturation and with scattered, larger pits, these last usually on the posterior half of the sclerite. Alate females have been recorded as follows, SOUTH AFRICA : January, February.

Subspecies *gallicola*, originally linked with *cubaensis*, is in fact a straight synonym of *spinicola*. The original description gives no indication of this but when Forel (1910*b* : 30) was comparing his *gallicola* specimens to *wilmsi* he noted that the median propodeal tooth was absent from the former but present in the latter. As *spinicola* and *gallicola* were described at the same time there is a possibility that the error arose due to mislabelling of the series of the various specimens.

The species has been recorded by Arnold (1924 : 752) as being found in acacia thorns, and is also known from collections of ants found in citrus trees. It is not clear whether the ants nest in the acacias.

MATERIAL EXAMINED.

KENYA : Kibwesi (*H. C. Hopton*). MOZAMBIQUE : Chibababa (*C. F. M. Swynnerton*); Delagoa Bay (Forel coll.). SOUTH AFRICA : Natal, Durban (*G. Arnold*) (*C. B. Cooper*) (*H. Marley*); Algoa Bay (*Brauns*); Mossel Bay (*R. E. Turner*); Mfongosi (*G. Arnold*).

Also recorded from Angola.

Polyrhachis viscosa F. Smith

(Text-figs 7, 13, 22, 39)

Polyrhachis viscosa F. Smith, 1858 : 71, pl. 4, fig. 41. Holotype worker, SOUTH AFRICA : Natal, Durban (BMNH) [examined].

Polyrhachis antinorii Emery, 1877 : 365. Syntype workers, ETHIOPIA : Sciotel, Keren (*Beccari*) (probably in MCSN, Genoa).

Polyrhachis viscosa var. *spretula* Santschi, 1923 : 294. Syntype workers, ♀, CONGO (KINSHASA) : Kasai, Dumbi, 6.x.1921 (*H. Schouteden*) (MRAC, Tervuren) [examined]. **Syn. n.**

Polyrhachis cubaensis subsp. *imatongica* Weber, 1943 : 388, pl. 16, fig. 22. Syntype workers, SUDAN : Imatong Mts, east slopes, 3800–4000 ft, 24.vii.1939 (*N. A. Weber*) (MCZ, Boston) [examined]. **Syn. n.**

Worker. TL 5·9–7·6, HL 1·56–1·96, HW 1·29–1·63, CI 80–86, SL 1·52–2·07, SI 119–135, PW 1·00–1·37, MTL 1·48–2·04. (30 measured.)

Clypeus usually with the anterior margin narrowly notched medially. Apex of scape greatly swollen in dorsal view, three or more times the width just distal of the basal neck and forming a hood which hides the base of the first funicular segment in dorsal view. First segment of funiculus dorsoventrally flattened basally. Eyes flat to weakly convex. Alitrunk marginate throughout its length. Promesonotal suture distinct; metanotal groove absent from or only very faintly present on the dorsal alitrunk, its location usually marked only by a weak indentation of the lateral margination or by a break in the sculpturation. Pronotal spines long and acute; propodeal teeth short, upcurved, connected by a transverse ridge running across the posterior margin of the propodeum, the ridge raised into a blunt tubercle medially. The size of this median propodeal tubercle is variable, being almost absent in small individuals, but occasionally as large as the propodeal teeth. Node of petiole with the lateral pair of spines long and directed upwards and backwards. Between them is a pair of shorter, acute spines of variable length. Anterior face of the first gastral segment concave medially.

Dorsum of alitrunk and gaster without erect hairs; all surfaces of body with a very sparse short, greyish pubescence, which may be absent.

Clypeus with a fine, longitudinal striation, loosely overlaid by fine shallow punctures. Head and alitrunk loosely and finely reticulate-rugose with the interspaces reticulate-punctate. Gaster finely and densely reticulate-punctate.

Female as worker, with the usual differences associated with the caste. Pronotal spines and propodeal teeth reduced, but often the median tubercle on the posterior propodeal margin is enlarged or double. Alate females have been recorded as follows, SUDAN : August.

Variety *spretula* was founded on a number of workers in which the dorsal pair of petiolar spines were considered by Santschi to be intermediate between *viscosa* and *nigrita*. As has been pointed out above, the dorsal spines of the petiole are variable in length and in fact, of the types of *spretula* examined, the majority were normal for *viscosa*. Of *imatongica* Weber states in the original description that the antennal scapes are, 'suddenly clavate distally'. Whilst this character is not de-

veloped in *cubaensis*, the species with which *imatongica* was associated, it is however diagnostic of *viscosa*. A direct comparison of types of the two forms assured the synonymy.

P. viscosa nests directly into sandy soil, usually in open localities. Foragers occur mostly on the ground but also ascend low bushes, trees and grass stems. A savannah and arid-zone species, it is interesting to note its occurrence on the coastal plains of Ghana as well as inland in the savannah proper.

MATERIAL EXAMINED.

GHANA : Nakong (*P. M. Room*); Tumu (*P. M. Room*); Mole Game Reserve (*J. C. Greig*); Kwabenya (*D. Leston*); Amfeda (*C. A. Collingwood*); Prampram (*C. A. Collingwood*); Legon (*D. Leston*). SUDAN : Darfur (*R. C. H. Sweeney*); Khor (*R. C. H. Sweeney*). TANZANIA : Duthumi (*A. Loveridge*). MALAWI: between Mangoche and Chikala Boma (*S. A. Neave*); Blantyre (*J. E. S. Old*); Mlanje (*S. A. Neave*); Kotakota (*C. Sweeney*). RHODESIA : Redbank (*G. Arnold*); Cawston Farm (*G. Arnold*). NIGERIA : Badeggi (*J. T. Medler*); Madaki (*M. G. Wood*). CONGO (KINSHASA) : Kwamouth (*H. Schouteden*).

Also recorded from Somali Republic, Ethiopia (type data), Kenya, Uganda, South Africa.

THE *REVOILI*-GROUP

Characterised by the partial or total loss of the margination of the alitrunk, the reduction or disappearence of the dorsal sutures of the alitrunk, and a tendency towards the reduction of sculpturation. All species in the group except *aenescens* have abundant long, erect hairs on all dorsal surfaces of the head and body, and a majority have long hairs on the appendages also.

This group is considered to have developed from the *viscosa*-group. In the important character of the loss of margination of the alitrunk a number of species are known which are intermediate between the groups of *viscosa* and *revoili*. The transition from a fully marginate to a completely immarginate condition is illustrated by the following series of species : *durbanensis*——→*transiens*——→*aenescens*——→*otleti*——→*regesa*——→*revoili*. In the first species, a member of the *viscosa*-group, the alitrunk has complete margination. The second species shows complete margination of the pronotum whilst the mesonotum and propodeum are very weakly and obtusely margined, the latter more weakly so than the former. The propodeal margination is lost in *aenescens*, and in *otleti* only the pronotum retains margins. In *regesa* the pronotal margination is weak and only extends for part of the length of the segment. No trace of margination remains in the last species of the series.

The dorsal sutures of the alitrunk are very much reduced, especially the metanotal groove. Apart from *platyomma* in which it is distinct, the groove is represented in most species only by a very faint line which may fail to break the sculpturation in places. In *volkarti* the metanotal groove is completely absent, and in *khepra* both dorsal sutures are supressed. The pronotal spines decrease in size as one moves away from the species most similar to those in the *viscosa*-group and the intensity of

sculpturation lessens, until in *braxa* the spines are represented by a pair of very small teeth and the integument is smooth and highly polished. In most species the sculpturation is similar to that found in the *viscosa*-group, that is, reticulate-punctate overlaid by rugulation or a rugoreticulum.

Propodeal armament is variable; in some species a pair of upcurved teeth are present but in others these are reduced to tubercles or are entirely absent. A modification found in some species of the group is the development of transverse propodeal ridges which separate the dorsum from the declivity. In all species where these ridges are present they are incomplete medially, with a small but distinct gap between them.

The petiole follows the pattern described for the *militaris* complex, the majority of species having a pair of long dorsal spines with a smaller lateral pair. The latter tend to be diminished in size in certain species and only a pair of minute teeth or tubercles remain in species such as *lanuginosa* and *khepra*.

Some of the earlier described species of the *revoili*-group were placed by Emery (1925 : 206) in his subgenus *Pseudocyrtomyrma*, which he erected in 1921, designating *revoili* as the type-species. In fact, he included the following species in the subgenus : *alexisi*, *curta*, *kohli*, *lanuginosa*, *platyomma*, *revoili* and *spitteleri*. As is now understood, only the third to fifth named (the third being a synonym of *volkarti*) are close to *revoili*, whilst the rest have different affinities. That the subgenus was poorly defined at its inception is shown by the fact that *spitteleri* is included whilst *monista*, its closest relative, is not; *curta* is included whilst *maynei*, a synonym, was grouped with *laboriosa*; and *alexisi* was apparently included as it did not fit in with any other species known at that time. With the removal of these species one is left with the nucleus of the *revoili*-group as it is understood at the present time, but the existence of species intermediate between the *viscosa*-group and *Pseudocyrtomyrma*, and the other similarities with both the *viscosa*- and *militaris*-groups discussed above shows that the formal subgeneric name is untenable, and it is consequently relegated to synonymy (p. 288).

The distribution of the species of the *revoili*-group is mostly confined to the forested areas of West and Central Africa and Uganda. Only *revoili* itself is found outside this area, in eastern and southern Africa.

Polyrhachis aenescens Stitz

(Text-figs 15, 32)

Polyrhachis aenescens Stitz, 1910 : 151. Holotype worker, CAMEROUN (*Knobloch*) (MNHU, Berlin) [examined].

Worker. TL 6·2, HL 1·60, HW 1·26, CI 79, SL 1·92, SI 152, PW 0·96, MTL 2·01. (Measurement of HL is approximate as head of holotype is partially crushed.)

Median portion of anterior clypeal margin projecting as a broad, truncated lobe. The median longitudinal carina of the clypeus is strongest anteriorly and projects slightly. For this reason the clypeal margin may appear broadly V-shaped in full-face view. Eyes convex; sides of head in front of eyes shallowly convex, behind the eyes the sides round into the convex occipital margin. Pronotum very weakly and obtusely margined for about half its length, the

margination best seen in lateral view. Mesonotum similarly but even more faintly margined throughout its length; propodeum not marginate. Dorsal surfaces of alitrunk convex; in side view the pronotum virtually flat, the mesonotum and propodeum sloping strongly to the declivity. Pronotum armed with a pair of small, triangular spines; propodeum with a pair of minute but broad teeth. Promesonotal suture represented only by a very faint line breaking the sculpturation. Metanotal groove even more poorly developed, visible only in certain illuminations and views. Petiole with a pair of long dorsal spines and a pair of minute lateral teeth.

Erect hairs absent from dorsal surfaces of body and from antennal scapes. Pubescence fairly dense, with a pale yellowish reflection on the pronotum, silvery grey on the gaster.

Sculpturation everywhere of a fine, dense reticulation. Colour black, the legs brown or orange-brown, with the tibiae lighter in colour than the femora.

This species is unique in the *revoili*-group as known at present as it has no erect hairs on the dorsal surfaces of the body, nor on the antennal scapes. In all other species of the group hairs are numerous, if not abundant. The species lies closest to *transiens* within the group, sharing a similar body form and an almost similar loss of alitrunkal margination. The lobe of the clypeus is notably broader in *aenescens*, the sutures of the alitrunk are fainter, and the lateral petiolar spines less distinct.

The original description of the species is misleading on a number of points; principally in that Stitz claims the pubescence to be, 'fine, golden-green and metallescent'. As described above the pubescence is pale yellowish on the pronotum and silver-grey on the gaster. It is possible that some of the colouration of the pubescence has faded since the species was originally described, but a change of this magnitude seems beyond credibility. Stitz also claims that a long tubercle is present on the dorsum of the alitrunk at the promesonotal junction, 'from which the surrounding surfaces of the back fall away outwardly in an arc'. Whilst it is true that the middle of the dorsum of the alitrunk at the promesonotal junction is the highest point in the outline, either in anterior or lateral view, the prominence cannot justifiably be termed a tubercle, as it is only part of the curvature of the dorsum, not set apart in any way.

Polyrhachis braxa sp. n.

(Text-figs 50, 56)

Holotype worker. TL 5·7, HL 1·29, HW 1·18, CI 91, SL 1·52, SI 129, PW 1·11, MTL 1·52.

Mandibles with five teeth; anterior clypeal margin arcuate and entire. Eyes weakly convex, situated close to the posterior corners of the head in full-face view. Sides of the head in front of the eyes shallowly convex; behind the eyes rounding almost immediately into the convex occipital margin. Head on each side with a short but distinct longitudinal groove terminating in a pit-like depression posteriorly; best seen in full-face view with the light incident upon the side of the head. This structure is situated close to the external margin of the antennal insertion, its total length about equal to the diameter of the antennal socket. Alitrunk not marginate, the dorsum transversely convex and everywhere rounding into the sides. Pronotum armed with a pair of very small, blunt teeth. Promesonotal suture and metanotal groove present but represented only by very weakly incised lines, the latter less well developed than the former. Propodeum with a pair of minute tubercles, considerably smaller than the prominences bearing the spiracles; declivity of propodeum between these tubercles and the spiracular openings

concave. Petiole thick and strongly biconvex in lateral view; in front view equipped with a pair of widely separated, straight spines dorsally, which are subtended by a pair of lateral teeth. The dorsum of the petiole between the spines straight and more or less flat. Anterior surface of first gastral segment shallowly concave medially to receive the posterior face of the petiole.

Head, alitrunk, gaster and appendages with numerous erect, pale, off-white hairs. Pubescence sparse and greyish, most dense on the sides of the alitrunk and on the petiole. On the pronotum the pubescence is densest dorsally in a transverse band running across the segment just in front of the promesonotal suture.

Entirety of head, alitrunk, gaster devoid of sculpturation except for a very fine superficial reticulation and the pits from which the hairs arise. The whole body shining. Petiole more dull and reticulate-punctate, but weakly so, the sculpturation partially hidden by the pubescence. Colour black, shining; the legs dark brown and the apical segments of the funiculus yellow-brown.

Two paratype workers, similar to the holotype but in one the pronotal teeth are better developed and more acute than in the holotype, the gaster is dark brown in colour and the legs are lighter brown. Dimensions: TL 5·7–5·9, HL 1·29–1·34, HW 1·18–1·22, CI 91, SL 1·52–1·56, SI 128–129, PW 1·11–1·13, MTL 1·52–1·56.

Holotype worker, GHANA : Eastern Region, CRIG, New Tafo, on cocoa tree, 4.iii.1970 (*C. A. Collingwood*) (BMNH).

Paratypes. Two workers, same data as holotype (BMNH).

The species appears to be related directly to *revoili* as it possesses an arcuate clypeal margin without a rectangular and truncated lobe, and a pair of tubercles upon the propodeum as opposed to a pair of ridges. It is however separated from *revoili* and from all other species of the group by the presence of the facial groove outside the antennal insertion, the reduced pronotal armament, and the lack of raised or incised sculpturation on any part of the head capsule, alitrunk or gaster. Superficially *braxa* resembles some members of the *rastellata* (Latreille) species-group of the Indo-Australia regions.

Polyrhachis khepra sp. n.

(Text-figs 51, 57)

Holotype worker. TL 5·6, HL 1·26, HW 1·00, CI 79, SL 1·44, SI 144, PW 0·89, MTL 1·34.

Mandibles with five teeth; anterior clypeal margin with a shallow, truncated rectangular lobe which is difficult to see because of the abundant hairs. Eyes convex; the sides of the head in front of the eyes weakly convex and somewhat convergent; behind the eyes the sides rounding into the evenly convex occipital margin. Alitrunk not marginate, the dorsal surface transversely and longitudinally convex. Dorsum of alitrunk smooth, without a trace of sutures. Pronotum armed with a pair of minute teeth; propodeum unarmed, the dorsum rounding into the sloping and shallowly concave declivity. Petiole with a narrow, longitudinal, keel-like ventral process. Petiole armed above with a pair of dorsal spines and these are subtended by a pair of small lateral teeth. Anterior face of first gastral segment not concave.

Entirety of head, body and appendages densely clothed with long, erect, fine hairs, which are either curved or sinuate and are yellowish in colour. Pubescence long, grey and sparse, most abundant on the sides of the alitrunk and on the appendages.

Clypeus unsculptured. Dorsum of head finely and densely rugose longitudinally, distinctly reticulate-rugose in the space separating the eye from the frontal carina on each side. Dorsum

of pronotum and propodeum unsculptured apart from the pits from which hairs arise, but the mesonotum with a few small, scattered, almost effaced longitudinal rugulae. Laterally the alitrunk with some fine reticulate-rugulation which is more or less confined to the lower halves of the mesopleuron and the sides of the pronotum. Anterior surface of petiole roughened, the sculpturation more or less concealed by the pubescence; the posterior face rugose. Gaster sculptured as propodeum but also with traces of a fine superficial reticulation, almost effaced. Colour black, the alitrunk and gaster polished, the head somewhat more dull. Femora black, tibiae and tarsi brown. Antennal funiculae yellow-brown, especially towards the apex.

The single paratype worker as the holotype but smaller; TL 5·2, HL 1·20, HW 0·96, CI 80, SL 1·38, SI 148, PW 0·85, MTL 1·26.

Holotype worker, GHANA : Eastern Region, Kibi, 24.iii.1970 (*P. M. Room*) (BMNH).

Paratype worker, same data as holotype (BMNH).

This small species is related to *otleti* and *regesa*, from which it may be distinguished by the very reduced sculpturation, the lack of sutures upon the dorsum of the alitrunk and the lack of propodeal armament. The abundant long hairs are similar to those of *lanuginosa*, as is the overall body shape, but in *lanuginosa* the anterior clypeal margin is arcuate and entire, without a truncated lobe, and the dorsum of the alitrunk is rugose everywhere.

Polyrhachis lanuginosa Santschi

Polyrhachis lanuginosa Santschi, 1909 : 394, fig. 17. Syntype workers, CONGO (BRAZZAVILLE) : Mindouli (*A. Weiss*) (NM, Basle) [examined].

Polyrhachis lanuginosa subsp. *santschii* Emery, 1921 : 24. Holotype ♀, CAMEROUN. [Nom. preocc. (not *santschii* Mann).]

Polyrhachis lanuginosa subsp. *conradti* Santschi, 1923 : 293. [Nom. substit. for *santschii* Emery.] **Syn. n.**

Polyrhachis lanuginosa subsp. *felici* Emery, 1925 : 206. [Nom. substit. for *santschii* Emery.] **Syn. n.**

Worker. TL 5·9–6·1, HL 1·52–1·59, HW 1·26–1·29, CI 79–84, SL 1·76–1·78, SI 132–138, PW 1·11–1·15, MTL 1·70–1·78. (2 measured.)

Anterior clypeal margin arcuate and entire. Eyes convex, sides of head in front of eyes gently convex, somewhat convergent anteriorly; behind the eyes the sides rounding into the convex occipital margin. Alitrunk convex, not marginate. Pronotum armed with a pair of short spines, directed outwards and slightly forwards. Promesonotal suture distinct, arcuate; metanotal groove extremely faint, barely breaking the sculpturation on the dorsum. In profile the propodeum appears to be armed with a pair of upcurved teeth but in dorsal view these are resolved as a pair of short, transverse ridges, interrupted medially by a small gap where the propodeal dorsum curves into the declivity. Petiole with a pair of long dorsal spines and a lateral pair of small teeth. Anterior surface of first gastral segment concave medially.

Entire body abundantly clothed with long, curved or sinuate, yellow-white, erect hairs. Pubescence long and greyish in colour, most abundant on the appendages and gaster.

Clypeus and gaster finely reticulate. Head finely, longitudinally rugose with some reticulation, more distinctly reticulate-rugose in the space separating the eye from the frontal carina. Dorsum of alitrunk finely longitudinally rugose, more irregularly so on the pronotum than elsewhere. Laterally the alitrunk is reticulate-rugose. Colour black, the antennal funiculi yellow-brown, the tarsi dark brown or black.

Female. Originally described as a subspecies, but now accepted as the female of *lanuginosa*. The original description of the female gives a number of differences from the worker which are usual in the genus, namely that the female resembles the worker except for slight differences in sculpturation (finer), reduction in size of spines and teeth on the alitrunk, and the petiolar spines a little longer than in the worker.

The arcuate clypeal margin, lacking a rectangular, truncated lobe, relates this species to *revoili* and its immediate allies. It is distinguished by the abundant long hairs and the presence of transverse ridges on the propodeum as opposed to teeth. The numerous hairs on the species give it a superficial resemblance to *khepra*, but the latter lacks sutures on the dorsum of the alitrunk, and its pronotum and propodeum are unsculptured.

Polyrhachis otleti Forel

(Text-figs 16, 34)

Polyrhachis otleti Forel, 1916 : 449. Syntype workers, ♀, ♂, CONGO (KINSHASA) : St Gabriel (*H. Kohl*) (MHN, Geneva) [examined].

Worker. TL 6·8–7·6, HL 1·63–1·71, HW 1·33–1·37, CI 80–83, SL 1·88–2·00, SI 140–146, PW 1·13–1·23, MTL 1·89–1·96. (9 measured.)

Anterior clypeal margin projecting medially as a truncate lobe, the angles of which are acute. Middle of the margin of this lobe with a small notch. Eyes convex, sides of head in front of eyes weakly convex, convergent; behind the eyes rounding into the broadly convex occipital margin. Dorsum of alitrunk transversely convex. Pronotum armed with a pair of triangular spines and marginate throughout its length. Mesonotum more obtusely marginate, the marginations distinct only when viewed from certain angles. Propodeum not marginate. Promesonotal suture present as a weakly incised, arcuate line; the metanotal groove usually very indistinct, represented only by a faint scoring across the dorsum of the alitrunk. Propodeum armed posteriorly with a pair of transverse ridges which appear as small teeth in profile. The ridges fail to meet medially and there is a small but distinct gap through which the dorsum meets the declivity. Petiole with a pair of long dorsal spines and a pair of shorter, lateral spines. The anterior surface of the first gastral segment concave medially.

Entire body, including head, with numerous long, white hairs and a fairly abundant long pubescence.

Clypeus, propodeal declivity, petiole and gaster finely reticulate. Head finely rugose, longitudinally so on the vertex but more distinctly reticulate-rugose in the space separating the eye from the frontal carina on each side. Alitrunk dorsally very finely longitudinally rugose, the direction most distinct on the pronotum. Colour black, dull, the apices of the antennal funiculi and the tarsi brown or red-brown.

Female as worker apart from the usual differences associated with caste, the pronotal spines reduced.

In the original description Forel records that the nest was in a cleft in the bark of a tree, 8 cm long and 2·5 cm broad, covered by a linen thread mixed with vegetable matter. A nest found by the present author in Nigeria was approximately 5 ft above ground level in a narrow, deep rot hole in a tree being used as shade in a cocoa plot. The entrance was covered by a fibrous mat composed of silk mixed with small pieces of bark which extended for quite some distance around the entrance hole of the nest proper. A number of workers were resting on the bark of the tree under

this mat and when the cover was broken ran out to investigate. Some specimens from Ghana collected by Dr D. J. Cross bear the label, 'In carton patch nest, on tree', which obviously refers to the same sort of structure.

MATERIAL EXAMINED.

GHANA : Tafo (*D. J. Cross*) (*C. A. Collingwood*). NIGERIA : Gambari (*B. Bolton*).

Polyrhachis platyomma Emery

Polyrhachis platyomma Emery, 1921 : 24, fig. 3. Holotype worker, CAMEROUN : 9.xi.1895 (*L. Conradt*) (MCSN, Genoa) [examined].

Worker. TL 6·1, HL 1·56, HW 1·37, CI 88, SL 1·85, SI 135, PW 1·40, MTL 1·81.

Anterior clypeal margin arcuate and entire, without a rectangular median lobe. Eyes flat, nearly concave, somewhat sunk into the sides of the head. Sides of head convex, rounding into the convex occipital margin behind the eyes. Alitrunk not marginate, the dorsum rounding into the sides. Pronotum armed with a pair of short, triangular, acute spines; the propodeum with a pair of small, upcurved teeth, between which the dorsum curves evenly into the declivity. Promesonotal suture represented only by a line which breaks the sculpturation, but the metanotal groove distinct and impressed. Dorsal surfaces of the alitrunk transversely convex; the pronotum notably broader than the propodeum. Petiole armed with a pair of long dorsal, and a pair of shorter lateral spines. Anterior surface of the first gastral segment concave medially.

Head, body and appendages with numerous long, erect hairs, yellowish to off-white in colour. Pubescence greyish, densest on the alitrunk.

Clypeus superficially reticulate, head regularly and finely longitudinally striate-rugose. Dorsum of alitrunk as head, but the rugae becoming disorganised on the mesonotum and propodeum. Sides of alitrunk finely reticulate-rugose apart from the propodeum which is longitudinally striate-rugose. Gaster finely and densely reticulate-punctate.

The species distinctly belongs to the *revoili*-group but is easily separated from all other constituent species by its possession of flattened eyes and an impressed metanotal groove. Nothing is known of the biology of this species, which as far as can be ascertained is known only from the single worker type.

Polyrhachis regesa sp. n.

(Text-figs 52, 58)

Holotype worker. TL 4·4, HL 1·14, HW 0·96, CI 84, SL 1·34, SI 139, PW 0·74, MTL 1·22.

Clypeus with a rectangular median lobe, the anterolateral angles of which are very acute, almost denticulate. Eyes convex; sides of head in front of eyes straight, behind the eyes gradually rounding into the convex occipital margin. Pronotum with a short, weak lateral margination extending back from the pronotal teeth, the margination not reaching the promesonotal suture. Remainder of alitrunk not marginate, the dorsum convex in both directions. Promesonotal suture present, narrow but distinct; metanotal groove absent from the dorsum of the alitrunk. Propodeum with a pair of minute tubercles, the dorsum rounding into the concave declivity between them. Petiole armed with a pair of spines dorsally and a pair of smaller lateral spines. Anterior face of first gastral segment concave medially.

Entirety of head, body and appendages with numerous erect, white hairs, those on the tibiae and scapes (especially the latter) notably longer than those on the dorsum of the gaster. Pubescence greyish, fine, least abundant on the head.

Clypeus finely reticulate-rugose, the rest of the head more coarsely so, especially in the space separating the eye from the frontal carina. Dorsum of alitrunk very finely reticulate and punctate-rugose; the gaster finely and superficially reticulate. Colour black, the alitrunk more dull than the gaster which is dully shiny. Antennal scapes and femora brown; funiculi, tibiae and tarsi yellow-brown.

A single paratype worker, as holotype but slightly larger; TL 4·8, HL 1·18, HW 0·96, CI 81, SL 1·41, SI 1·47, PW 0·81, MTL not measurable due to method of mounting of the specimen.

Holotype worker, GHANA : Eastern Region, Mampong, 12.iii.1970 (*P. M. Room*) (BMNH).

Paratype worker, GHANA : Eastern Region, Adeiso, by pyrethrum knock-down, sample C3/6, 17.vi.1970 (*D. Leston*) (UG, Legon).

Related to *otleti* and *khepra*, it is separable from the former by the presence of propodeal tubercles as opposed to ridges, and from the latter by marked differences in sculpturation and development of the sutures of the alitrunk.

Polyrhachis revoili E. André

Polyrhachis revoili E. André, 1887 : 285. Holotype ♀, SOMALI REPUBLIC (*Revoil*) (probably in MNHN, Paris).

Polyrhachis natalensis Santschi, 1914*b* : 41. Syntype workers, SOUTH AFRICA : Natal, Stamford Hill, 25.i.1905 (NM, Basle) [examined].

Polyrhachis revoili var. *donisthorpei* Forel, 1916 : 453. Syntype workers, ZAMBIA (probably in MHN, Geneva). **Syn. n.**

Worker. TL 6·1–6·5, HL 1·51–1·59, HW 1·44–1·48, CI 93–95, SL 1·63–1·66, SI 112–113, PW 1·40–1·48, MTL 1·66–1·70. (7 measured.)

Anterior clypeal margin arcuate and entire or with a very shallow, small median emargination. Eyes convex, the sides of the head in front of the eyes weakly convex and converging anteriorly. Behind the eyes the sides round into the very shallowly convex occipital margin. Alitrunk not marginate, transversely convex dorsally. The sutures reduced to faint lines; promesonotal suture rather better defined than the metanotal groove, which is not impressed. Pronotum very broad, more than twice the width of the propodeum measured across the teeth. Pronotum with a pair of short, acute spines of variable length, the propodeum with a pair of upcurved teeth. Petiole armed with a long pair of spines dorsally and a shorter, upcurved lateral pair. Anterior face of first gastral segment shallowly concave medially.

Head, body and appendages everywhere with abundant, erect, white to greyish hairs. Pubescence greyish and dense, partially or wholly concealing the sculpturation upon the dorsum of the alitrunk.

Head finely, longitudinally striate-rugose. Dorsum of the pronotum similar to head but rugae less distinct and with a tendency to meander. On the dorsa of the mesonotum and propodeum the rugae are disorganised or arranged into a fine, loose rugoreticulum. Gaster finely reticulate-punctate or superficially reticulate. Colour usually uniform black, dull, with the gaster shining. The head is usually more shiny than the alitrunk. Legs may be black, black-brown, or red-brown, and the antennal funiculi are often brown towards the apex.

Female as worker apart from the usual differences associated with caste. The pronotal spines and propodeal teeth are reduced; the latter may even be absent.

Some 22 years after André's original description of *revoili*, Santschi (1909) described a new species, *weissi*, based upon the worker caste. Later workers tended to treat *weissi* as a subspecies or variety of *revoili*, as indeed did Santschi himself in his later review of the *revoili* complex (Santschi, 1939). A number of other infraspecific names were appended to *revoili* between 1914 and 1939, and differing opinions were voiced concerning the actual status and relationships of these forms. Forel (1916) stated that he could not distinguish *revoili* from *natalensis*, and that *weissi* seemed to him to be only a variety with a more striated alitrunk. He added, however, that Santschi had pointed out several other differences between *weissi* and *revoili* in a letter. Forel then went on to describe the var. *donisthorpei*, for which there was less justification than Santschi's *natalensis*, later given as a synonym of *revoili* by Arnold (1924 : 754).

In his description of st. *balli* Santschi (1939) notes its similarities to *conduensis* and *weissi* and its differences from *natalensis*, which he appears to have retrieved from the synonymy. He then states his views on the *revoili* complex of infraspecific forms and concludes that *revoili* as described by Forel (1894) and Arnold (1924) were in fact *natalensis*, whilst the species noted by Forel (1916) was really *conduensis*.

The present study implies that *revoili* and *weissi* must be treated as separate although very closely related species. The characters used to separate them appear quite trivial, but are apparently consistent. Further study may show this premise to be incorrect but for the present the species emerge as indicated below.

P. revoili is a larger, noticeably more thickset species (PW 1·40 or more) with a distribution limited to the southern savannah and veldt regions. Erect hairs are more numerous everywhere (>30 on each antennal scape) and the pubescence is dense enough to hide the sculpturation of the alitrunk, at least in part. Of the constituent segments of the dorsal alitrunk only the pronotum is distinctly longitudinally rugose, whilst on the other surfaces the rugae are disorganised or a rugo-reticulum is present. On the other hand, *weissi* is a smaller, more slender species (PW 1·26 or less) restricted to the forested areas of West and Central Africa. Erect hairs are more sparse (from none to about 10 on each scape) and the pubescence is fine and short, not masking the sculpturation. The entire dorsum of the alitrunk is sharply longitudinally rugose. On these separational characters the infraspecific names arrange themselves in the following synonymies:

weissi : = *conduensis*, = *balli*, = *crassa*, = *phaenogaster*.

revoili : = *natalensis*, = *donisthorpei*.

Santschi's (1939) grouping of infraspecific forms is more or less retained in the synonymies and Arnold's (1924) synonymy of *natalensis* with *revoili* is justified. The only remaining infraspecific name of *revoili* is the st. *volkarti*, which is now known to be the senior name of *P. kohli*, and is dealt with separately.

MATERIAL EXAMINED.

ZAMBIA : no loc. (*Rothney*). SOUTH AFRICA : Natal, Durban (*C. B. Cooper*); Natal (*Trägårdh*).

Also recorded from Somali Republic (type data).

Polyrhachis transiens sp. n.

(Text-figs 47, 59)

Holotype worker. TL 7·2, HL 1·63, HW 1·40, CI 86, SL 1·81, SI 129, PW 1·18, MTL 1·85. Anterior clypeal margin extended into a very narrow, truncated, subrectangular lobe; the margin on either side of the lobe gently concave. Eyes convex, situated on the posterior third of the side of the head. Sides of the head in front of the eyes shallowly convex, very gradually converging anteriorly. Behind the eyes the sides round rather abruptly into the shallowly convex occipital margin. Pronotum armed with a pair of spines, distinctly marginate between the spines and the promesonotal suture; the latter well developed, weakly incised across the dorsum. Mesonotum not distinctly marginate but with an obtuse angle between the dorsum and the sides, which is best observed in profile. Metanotal groove represented only by a faint line, which just breaks the dorsal sculpturation. Propodeum even more weakly and obtusely margined than the mesonotum, the lines followed by the angulations lying inside those of the mesonotal angulations and considerably less distinct. Propodeum armed with a pair of minute teeth which are slightly extended towards the centre of the segment but do not form a pair of ridges between the dorsum and the declivity. Petiole with a pair of long dorsal spines and a pair of lateral spines which are shorter and less stout. Anterior face of first gastral segment concave medially to accommodate the convex posterior face of the petiole.

All dorsal surfaces of head, body, and the antennal scapes with numerous short, fine, erect, greyish hairs. A short but dense greyish pubescence present on all surfaces of the body.

Clypeus finely and superficially reticulate. Head finely and densely striate-rugose longitudinally. Alitrunk similar to head but the rugae much finer and more dense, especially on the propodeal dorsum. Gaster very finely and densely reticulate-punctate. Colour black, the apical half of the antennal funiculi yellow-brown. Femora black-brown, the tibiae and tarsi dark brown.

Paratype workers as holotype, but with a range of dimensions: TL 7·0–7·4, HL 1·63–1·67, HW 1·29–1·40, CI 78–84, SL 1·70–1·89, SI 132–134, PW 1·14–1·21, MTL 1·76–1·93. (4 measured).

Paratype female answering to description of worker but with the usual differences associated with caste and with the pronotal margination reduced, extending only half the length of the segment. Angulation absent from the propodeum, the dorsum rounding into the sides. Pronotal spines and propodeal teeth reduced, the latter to a pair of minute, laterally extended ridges.

Holotype worker, UGANDA : Kampala, carton nest between citrus leaves over *Lepidasaphes* scale, no. 0427, 24.ix.1930 (*H. Hargreaves*) (BMNH).

Paratypes. 4 workers, 1 ♀, same data as holotype (BMNH). The species presents a condition between the *viscosa*- and *revoili*-groups, as is discussed above under the introduction to the *revoili*-group.

The carton referred to in the data on the type-series probably represents a mixture of silk, vegetable fragments and fungal hyphae, as is encountered in many other species. The presence of scale insects in the nest may be an artifact, but strongly suggests that scales play a part in the food requirements of this species.

Polyrhachis volkarti Forel **stat. n.**

(Text-figs 4, 17)

Polyrhachis revoili st. *volkarti* Forel, 1916 : 453. Holotype ♀, CONGO (KINSHASA) (*H. Kohl*) (MHN, Geneva) [examined].

Polyrhachis kohli Forel, 1916 : 454. Syntype worker, ♀, CONGO (KINSHASA) (*H. Kohl*) (MHN, Geneva) [examined]. **Syn. n.**

Worker. TL 5·9, HL 1·37, HW 1·00, CI 73, SL 1·81, SI 181, PW 0·89, MTL 1·70.

Median portion of clypeus projecting anteriorly as a truncated, rectangular lobe. Head long and relatively narrow; the eyes strongly convex, almost hemispherical. Sides of head in front of the eyes weakly convex, somewhat convergent anteriorly. Alitrunk convex transversely, long and narrow, not at all marginate. Pronotum armed with a pair of short, triangular spines; the propodeum with a pair of short transverse ridges separating the dorsum from the declivity. The ridges do not meet medially and a small but distinct gap is present. Promesonotal suture represented by a faint line which just breaks the sculpturation; metanotal groove absent. Petiole armed dorsally with a pair of spines and laterally with a pair of teeth. Anterior face of the first gastral segment concave medially.

Entirety of head, body and appendages covered with abundant long, fine, erect hairs, some of which are curved or gently sinuate. Pubescence dense and greyish in colour.

Clypeus and gaster finely and densely reticulate; head and dorsum of alitrunk finely and densely longitudinally rugose, the rugae overlying a superficial reticulate-puncturation. Sides of the alitrunk with a fine rugoreticulum.

Female as worker but with the pronotal spines and propodeal ridges very much reduced, the latter to a pair of short, rounded prominences, best seen in posterior view. Sculpturation of the alitrunk finer, the longitudinal rugae of the alitrunk supressed in favour of the reticulate-puncturation.

A member of the *revoili*-group, *volkarti* is distinguished by its narrow build, truncate clypeal lobe, lack of a metanotal groove and presence of a pair of propodeal ridges. As far as is known the two type collections listed above represent the only specimens of this species.

To account for the fact that the same species was described twice in the same publication, once as a new species and then as a race of a second species, one can only assume that Forel was dealing with a split series and that he only gave cursory attention to the single female specimen which constituted his stirps *volkarti* whilst taking a greater interest in the worker specimen which had a female associated with it. If this was the case it is surprising that he did not himself notice the similarities between his descriptions of *volkarti* and *kohli*. For instance, in his description Forel notes that *volkarti* is 'much more slender than the type of the species' (i.e. *revoili*) and that, 'the head is much more narrow and elongate' and also that the 'anterior lobe (of the clypeus) is much longer than in the type'.

He also comments upon the great length of the scape as compared to *revoili*. These features ought to have indicated the similarities of the females of *volkarti* and *kohli*, and the differences between the former and the female of *revoili*.

Polyrhachis weissi Santschi

Polyrhachis weissi Santschi, 1909 : 395, fig. 18. Holotype worker, CONGO (BRAZZAVILLE) : Brazzaville (*A. Weiss*) (NM, Basle) [examined].

Polyrhachis revoili var. *conduensis* Forel, 1915 : 351. Syntype workers, CONGO (KINSHASA) : Kasai, Kondue (*E. Luja*) (MRAC, Tervuren) [examined]. **Syn. n.**

Polyrhachis revoili subsp. *crassa* Emery, 1921 : 23, fig. 2. Syntype worker, ♀, CAMEROUN : 1895 (*L. Conradt*) (MCSN, Genoa) [examined]. **Syn. n.**

Polyrhachis revoili subsp. *crassa* var. *phaenogaster* Emery, 1921 : 24. Syntype ♀♀, CAMEROUN (depository unknown). [Name not available.]

Polyrhachis revoili subsp. *balli* Santschi, 1939 : 10. Syntype workers, CONGO (KINSHASA) : Gazi, xii.1937 (*Beinaert*) (NM, Basle) [examined]. **Syn. n.**

Worker. TL 5·7–6·1, HL 1·40–1·48, HW 1·29–1·40, CI 88–95, SL 1·66–1·74, SI 124–125, PW 1·18–1·26, MTL 1·59–1·66. (15 measured.)

Anterior clypeal margin arcuate and entire. Eyes convex, the sides of the head gently convex and convergent anteriorly. Alitrunk not marginate, the dorsum convex. Promesonotal suture faint but distinct, the metanotal groove reduced to a line which only breaks the sculpturation. Pronotum very broad, more than twice the width of the propodeum measured across the teeth. Pronotum armed with a pair of short, acute spines of somewhat variable configuration; the propodeum with a pair of small, upcurved teeth. Petiole with two pairs of spines, the dorsal pair long and acute, the laterals much shorter and weakly upcurved. Anterior face of the first gastral segment shallowly concave medially.

Head and body with numerous erect hairs, white to grey in colour. Hairs very sparse or absent from the antennal scapes. Pubescence everywhere sparse, short, greyish in colour, nowhere concealing the underlying sculpturation.

Head and entire dorsum of alitrunk finely, longitudinally striate-rugose. Gaster finely and superficially reticulate. Colour uniform black, or with the appendages somewhat lighter, either dark brown or red-brown. Antennal funiculi usually with the apical five or six segments light brown.

Female as worker but with the pronotal spines reduced to mere teeth and the propodeal teeth minute or absent. The sculpturation of the mesoscutum tends to be notably finer than that of the head. Alate females have been recorded as follows, GHANA : July.

The affinities of *weissi* lie with the *revoili*-group, and this species is actually the closest known relative of *revoili*. The two species may in fact be inseparable and this and the synonyms of the two are discussed in more detail under *revoili*, where notes on the separation of the two are given.

P. weissi may be regarded as the forest equivalent of *revoili*, which appears to be confined to savannah and veldt regions. Nests of silk and vegetable particles are constructed under leaves or between contiguous leaves which are gummed together by the silk. A small nest dissected at CRIG, New Tafo in July 1970 by P. M. Room contained seven workers, six females (all alate), five males, and 32 brood (larvae and pupae).

MATERIAL EXAMINED.

GHANA : Tafo (*G. S. Cotterell*) (*P. M. Room*); Aburi (*P. M. Room*); Berekuso (*P. M. Room*); Akuadom (*A. H. Strickland*).

Also recorded from Cameroun (type data), Congo (Kinshasa) (type data), and Congo (Brazzaville) (type data).

THE *MONISTA*-GROUP

The two species constituting this group are characterised by their lack of margination on the alitrunk, the great development of the metanotal groove and the presence of coarse, usually yellowish bristles on the dorsal surfaces of the head and body. The sculpturation consists of a fine, dense striation on the head and alitrunk and a fine reticulation or reticulate-puncturation on the gaster. The propodeal spines are well developed and nearly or quite as long as those on the pronotum.

The group appears to be derived from the *militaris*-group and this view is supported by the form of the petiole which is very similar to that found in *fissa*, with the lateral spines rather better developed than the dorsals. In *monista* itself the promesonotal suture has developed into a very broad, deep cleft so that the mesonotum in profile stands out as an isolated, subtriangular block. In *spitteleri* the sutures are much less developed and the species is rather *fissa*-like apart from the lack of margination on the alitrunk and the very elongate propodeal spines.

The distribution of the two species is limited to forested areas, particularly in West and Central Africa.

Polyrhachis monista Santschi

(Text-figs 18, 28)

Polyrhachis monista Santschi, 1909 : 398, fig. 20. Holotype ♀, CONGO (BRAZZAVILLE) (probably in NM, Basle).

Worker. TL 5·5–6·4, HL 1·27–1·52, HW 1·22–1·41, CI 88–94, SL 1·40–1·59, SI 113–120, PW 0·96–1·04, MTL 1·40–1·74. (9 measured.)

Anterior clypeal margin arcuate and entire. Sides of head in front of the strongly convex eyes converging anteriorly, almost straight. Alitrunk not marginate, the dorsal surfaces of the pronotum and propodeum rounding evenly into the sides. Pronotum and propodeum each armed with a pair of thick spines, those of the pronotum directed outwards and upwards, those of the propodeum somewhat shorter and upcurved. Pronotum separated from mesonotum by a very deep broad groove. Mesonotum and propodeum similarly separated, the direction of the groove slanting forwards in profile so that its base meets the base of the promesonotal groove above the anterodorsalmost point of the mesopleuron. A welt bearing the mesothoracic spiracle projects from the base of the groove posteriorly. Petiole with four spines, the lateral pair slightly longer than the dorsal pair; all the spines curved backwards towards the base of the gaster. Median portion of anterodorsal border of the first gastral segment with a sharp, transverse margin separating the concave anterior face from the convex dorsal face.

Coarse, erect hairs present on all dorsal surfaces, varying in colour from white through straw-yellow to pale brown. Hairs strongly curved posteriad on the dorsum of the anterior half of the first gastral segment. Pubescence everywhere sparse or absent, densest on the pleurae.

Basic sculpturation of the head and alitrunk of fine, dense striation, longitudinal on the dorsum of the head, more or less longitudinal on the pronotal dorsum but tending to diverge posteriorly and following the curve of the sclerite, so that they are oblique on the sides of the pronotum. Striation transverse on the mesonotum, broadly V-shaped on the propodeum. Gaster with a fine, superficial reticulation, smooth and highly polished. Colour black, the colour

of the extremities variable. In the majority of specimens the antennal funiculi become lighter apically, almost yellow in some smaller individuals but usually brown. Femora usually brown-black but may be paler, in one very small specimen from Nigeria the tibial apices are a deep red-brown.

Female in general very much like the worker but the adaptations of the alitrunk seen in, and so diagnostic of the worker are much reduced in the present caste. The promesonotal suture is well developed, but does not form a broad, deep groove as in the worker, whilst the developed metanotum more or less fills the posterior groove, but still leaves enough space for a deep, narrow trench between itself and the propodeum.

The species is separated from its closest relative, *spitteleri*, by the absence of a deep promesonotal groove and the presence of a prominence between the propodeal spines in the latter species.

P. monista nests and forages arboreally. The nests are a mixture of silk and vegetable particles, often enclosed between a pair of leaves. Forel (1916 : 452) reported a carton nest built inside a rolled-up leaf.

MATERIAL EXAMINED.

NIGERIA : Ibadan (*J. Cloudsley-Thompson*) (*R. H. Booker*). UGANDA : Kasokwa (*H. Hargreaves*).

Also recorded from Ghana, Congo (Brazzaville) (type data) and Congo (Kinshasa).

Polyrhachis spitteleri Forel

(Text-figs 19, 29)

Polyrhachis spitteleri Forel, 1916 : 450, fig. 6. Holotype worker, CONGO (KINSHASA) (*H. Kohl*) (MHN, Geneva) [examined].

Worker. TL 4·8–5·6, HL 1·14–1·37, HW 1·00–1·22, CI 87–89, SL 1·21–1·40, SI 114–121, PW 0·81–0·96, MTL 1·26–1·52. (5 measured.)

Anterior clypeal margin arcuate, entire. Eyes convex, the sides of the head converging in front. Alitrunk not marginate, the sides rounding evenly into the dorsum. Pronotum armed with a pair of spines; propodeum with a pair of long, curved spines, between which is a median dorsal tubercle or prominence. In the type specimen this prominence is low, but in other specimens it is higher and distinct. Between this median prominence and the spine on either side the propodeal dorsum rounds into the declivity. Promesonotal suture distinct and incised, but shallow. Metanotal groove broad and impressed. Petiole with four spines of approximately equal size, the laterals tending to be somewhat longer and more stout than the dorsals. Anterior face of the first gastral segment concave medially.

Thick, yellowish hairs with a waxy appearance abundant on the dorsum of the alitrunk; most dense on the mesonotum. Similar hairs are present on the gaster, but those on the head are usually shorter and paler in colour.

Clypeus, head to level of eyes, and gaster reticulate-punctate, the last more coarsely so than the head. Remainder of head longitudinally striate-rugose. Dorsum of alitrunk longitudinally striate-rugose, noticeably more coarsely so than on the head; the rugae of the mesonotum and more especially the propodeum tending to converge posteriorly. Sides of pronotum sculptured as dorsum but the pleurae, sides of propodeum and declivity of the latter covered with a fine rugoreticulum. Colour black, the appendages usually lighter, black-brown or dark brown.

Very closely related to *monista*, this species is easily separated by the presence of a median propodeal prominence between the spines, and the slight development of the promesonotal suture in the species as compared to the broad, deep cleft noted in *monista*. In the original description Forel failed to notice the presence of the median propodeal prominence, and although this is smaller in the type than in the Ghanaian material examined, it is still quite distinct.

The nesting behaviour of *spitteleri* is not known, but that it is completely arboreal in habit is suggested by its collection in pyrethrum knock-down samples from trees when it has not been found by more normal collecting methods in the same area.

MATERIAL EXAMINED.

GHANA : Kade (*D. Leston*).

Also recorded from Congo (Kinshasa) (type data).

THE *ALEXISI*-GROUP

The medium sized to small species making up this group are easily recognised by their very short, broad and deep alitrunks. The pronotum is always marginate, at least for part of its length, but the mesonotum, propodeum, or both, may lack margination. On the head the anterior clypeal margin is equipped with a shallow, rectangular lobe which terminates laterally in a pair of acute, dentiform angles or is flanked by a pair of small teeth. The eyes are usually situated high up on the sides of the head, usually not breaking the outline of the sides in full-face view.

The promesonotal suture is invariably present but the metanotal groove is reduced to a faint line or is absent. Propodeal margination varies from fully marginate both laterally and posteriorly as in *latharis* and *limitis* to a situation in which the propodeum is totally without margination, as in *curta* and *alexisi*. Another species, *lestoni*, seems to occupy an intermediate position as the lateral propodeal marginations are missing whilst the posterior is present. In all species the propodeum is unarmed, there being no trace of spines or teeth.

The petiole is equipped with two or four teeth or spines in the various species but the basic shape of the segment is a thick, high scale with an acute dorsal margin and with four spines, of which the dorsals are longer than the laterals. Away from this, the most common form, one has on the one hand *lestoni* which retains only the lateral armament of the petiole as a pair of teeth, and on the other hand *curta* which has retained only the dorsal pair as two long hooks. Erect hairs are usually absent except on the anterior clypeal margin and the gastral apex, but in some species a few may be present on the dorsum of the head.

The affinities of this small group are not immediately apparent. No intermediate forms are known but a derivation from the *militaris*-group is suspected because of the structure of the alitrunk and petiole. All species are arboreal, and their distribution is limited to the rain forests of West and Central Africa.

Polyrhachis alexisi Forel

(Text-figs 20, 31)

Polyrhachis alexisi Forel, 1916 : 455, fig. 7. Syntype workers, CONGO (KINSHASA) (*H. Kohl*) (MHN, Geneva) [examined].

Worker. TL 4·8, HL 1·19, HW 1·00, CI 84, SL 1·26, SI 126, PW 0·89, MTL 1·26.

Median portion of anterior clypeal margin projecting as a shallow, rectangular lobe, ending laterally in a pair of acute denticles. Sides of the head straight to weakly concave in front of the eyes, gradually converging anteriorly. Eyes convex, just breaking the outline of the sides of the head in full-face view. Alitrunk short, broad, convex dorsally. Pronotum armed with a pair of short spines, marginate for about half the distance between the base of each spine and the promesonotal suture. Remainder of alitrunk not marginate, the dorsum rounding without interruption into the sides. Promesonotal suture shallow but distinct, metanotal groove absent. Propodeum unarmed, the dorsum rounding into the declivity, the two surfaces not separated by a transverse ridge or margin. Declivity of propodeum very deep, concave in profile. Petiole with a pair of dorsal spines and a pair of lateral teeth. Anterior surface of the first gastral segment concave medially.

Erect hairs absent except on the clypeus, mandibles, and gastral apex. Pubescence extremely short and sparse.

Clypeus and gaster finely reticulate. Head finely, longitudinally striate. Dorsum of alitrunk with an exceedingly fine and dense striation overlying a superficial reticulation. In dorsal view the striae are longitudinal and somewhat arched on the pronotum, divergent on the mesonotum and posteriorly convergent on the propodeum. Sides of alitrunk finely reticulate apart from the propodeum which is striate as the dorsum. Colour black, the appendages brown, and with the antennal funiculi yellow-brown.

The species is apparently known only from the type collection. It is distinguished from its relatives by the development of the petiolar spines and the complete lack of propodeal margination.

Polyrhachis curta E. André

(Text-figs 21, 25)

Polyrhachis curta E. André, 1890 : 312. Holotype worker, SIERRA LEONE (probably in MNHN, Paris).

Polyrhachis maynei Forel, 1911 : 282. Holotype worker, CONGO (KINSHASA : Congo de Lemba (*R. Mayné*) (MRAC, Tervuren) [examined]. **Syn. n.**

Polyrhachis lyrifera Stitz, 1933 : 78, fig. 5a, 5b. Holotype worker, CAMEROUN : Bakossigeb, 16.ii.1920 (*H. Schulz*) (MNHU, Berlin). **Syn. n.**

Worker. TL 7·4–7·6, HL 1·70–1·77, HW 1·52–1·78, CI 89–100, SL 2·07–2·11, SI 118–136, PW 1·48–1·74, MTL 2·00–2·04. (2 measured.)

Anterior clypeal margin arcuate, with a pair of minute denticulae which form the borders of an extremely shallow median lobe. Sides of head convex posteriorly, tending to be more straight and somewhat convergent in front of the eyes. Eyes situated well up on the sides of the head, not breaking the outline of the sides in full-face view. Pronotum armed with a pair of spines, marginate between the base of each spine and the distinct promesonotal suture. Mesonotum marginate from the promesonotal suture almost to the junction with the propodeum. Metanotal groove absent, replaced by an angle which separates the mesonotum from the very oblique dorsal surface of the propodeum. Propodeum not marginate, unarmed, the dorsum very oblique

and sloping into the vertical and weakly concave declivity. In front view the sides of the petiole diverge from the base, pass through a rounded angle and then converge dorsally to the bases of a pair of curved spines. The spines rise almost vertically from the dorsum of the petiole and then curve outwards and somewhat backwards, giving the petiole a lyre-like appearance. There are no lateral teeth or spines. Anterior face of the first gastral segment very deep and concave.

Erect hairs absent from all dorsal surfaces except the clypeus, gastral apex, and one or two pairs on the vertex. Pubescence everywhere short and yellowish grey in colour.

Sculpturation everywhere of a fine, dense reticulation.

Female answering to the above description, but with the expected modifications of the alitrunk. The propodeum is more orthodoxly shaped than in the worker, having a definite, convex dorsal surface, which rounds into the declivity. Pubescence is rather more dense than in the worker, and the dorsal sclerites of the mesothorax have a few erect hairs, particularly on the mesoscutellum. A recently dealate female was recorded in Ghana in April.

This very distinctive but rare species seems to have been found on only six or seven occasions, in each case a single worker or female being captured. On three of these occasions the species was described as new. The form of the head, alitrunk, and especially the petiole render specimens very easily identifiable, in fact, the petiolar structure is unique.

The single worker and female in my possession and the holotype of *maynei* were compared in turn with the descriptions of *curta*, *maynei*, and *lyrifera* and were found to fit each of them. *P. maynei* was originally separated from *curta* on the grounds that the former lacked a prosternal tooth, had a mesosternal tooth, and had the front of the propodeum making a part of the dorsum of the alitrunk. Forel did not see any specimens of *curta* before describing *maynei*, and he appears to have misinterpreted some of André's terms. For instance, André stated that in *curta* the 'sides of the prosternum (i.e. pronotum) terminating below in two strong, blunted, triangular teeth', which probably refers to the strongly triangular shape of the lateral pronotum, apex downwards, rather than to the presence of distinct and separate teeth. Forel, however, seems to have taken the statement at face value and says that no such teeth are present in *maynei*.

Conversely, Forel claims a mesosternal tooth to be present in *maynei*, which is not mentioned in the original description of *curta*. In this case the position of the middle coxae and the method of mounting the specimen determines whether or not the tooth (actually it appears to be the end of a transverse ridge separating the pro- and mesothorax ventrally) is visible.

As for the question of whether the propodeum constitutes a part of the dorsal alitrunk, Forel states that for *maynei* the propodeum, 'forms a single boss with the mesonotum', and later, 'the front of the epinotum (i.e. propodeum) making a part of the thoracic dorsum'. For *curta*, André had written that the propodeum, 'does not form a part of the thoracic dorsum. That is to say that the basal (i.e. dorsal) face and the declivity form a plain, at first very oblique, then vertical'. Both statements are in fact correct and are describing the same character from two different points of view. Immediately behind the angle separating the mesonotum from the propodeum the latter falls steeply away to the declivity proper, from which it is not at all separated. Forel obviously regarded this sloping part of the propodeum

as part of the dorsum, whilst André chose to regard it as a continuation of the declivity.

In the case of *lyrifera*, Stitz's description and figures are good enough to recognise the species at a glance, and one can only assume that he was ignorant of the previously published descriptions. This contention is supported by the fact that he differentiates his *lyrifera* from *alexisi*, but not from *curta* or *maynei*. Santschi (1939 : 13) treated *lyrifera* as a variety of *curta*, and the name is now relegated to the synonymy.

The two specimens before me were both collected by pyrethrum knock-down from the forested regions of Ghana. The previous captures of the species show that it ranges throughout the rain forest areas of the continent but is very uncommon. Previous authors make no mention of the nesting site of the species, and nothing is known of its biology save that it is arboreal.

MATERIAL EXAMINED.

GHANA : Bunso (*C. A. Collingwood*); Yakasi (*D. Leston*).

Also recorded from Sierra Leone, Cameroun (type data) and Congo (Kinshasa) (type data).

***Polyrhachis latharis* sp. n.**

(Text-figs 49, 60)

Holotype worker. TL 6·5, HL 1·45, HW 1·19, CI 82, SL 1·59, SI 133, PW 1·37, MTL 1·52.

Mandibles with five teeth. Anterior margin of clypeus projecting medially as a shallow, rectangular lobe, the corners of which are minutely dentate. Between these small teeth is a notch flanked by two denticles. Head broadest posteriorly, the sides converging in front. Sides of head convex behind level of eyes, weakly concave in front. Eyes convex, set well up on the sides of the head close to the frontal carinae and not breaking the outline of the sides in full-face view. Alitrunk antero-posteriorly compressed and expanded laterally, giving a swollen and foreshortened appearance in dorsal view. Pronotum armed with a pair of short spines, marginate for about half its length and with the dorsal surface strongly convex. Mesonotum not marginate, separated from the pronotum by the promesonotal suture which is represented by a break in the sculpturation. Propodeum unarmed, marginate laterally and with a weak transverse ridge separating the dorsum from the declivity. Metanotal groove represented only by a faint scoring across the sculpturation of the dorsum. In dorsal view the sides of the propodeum are expanded so that the total width of the segment is noticeably greater than the width between the lateral marginations. Declivity of propodeum very deep, shallowly concave. Scale large in proportion to alitrunk, equipped with four short spines. The dorsal pair are directed upwards, outwards and backwards, and the length of each spine is less than half the length separating them along the dorsal edge of the scale. The lateral pair of spines are smaller than the dorsals, and are dentiform. Anterior face of first gastral segment strongly concave.

Erect hairs absent from all dorsal surfaces of head, alitrunk and gaster. A very sparse, short pubescence present on all surfaces, difficult to see at low magnifications.

Clypeus, declivity of propodeum and gaster finery reticulate. Head and dorsal surfaces of alitrunk longitudinally striate-rugose, the rugae less regular on the pronotum and tending to a disorganised rugoreticulum laterally. Mesonotal rugae diverging posteriorly. Sides of pronotum and mesopleuron reticulate-rugose; sides of propodeum striate-rugose as the dorsum. Colour black, with the antennal funiculi yellow-brown.

Paratype workers as holotype, but with the following range of dimensions: TL 6·5–7·0, HL 1·40–1·46, HW 1·19–1·26, CI 82–90, SL 1·55–1·63, SI 124–133, PW 1·37–1·40, MTL 1·45–1·53

(3 measured). Paratype females as workers, with the usual modifications in the structure of the alitrunk found in this caste.

Holotype worker, GHANA : Eastern Region, Mount Atewa, by pyrethrum knock-down, sample A5/7, 12.vii.1969 (*D. Leston*) (BMNH).

Paratypes. 3 workers, 2 ♀, same data as holotype, from pyrethrum knock-down samples A4/4 (♀), A5/5 (♀), A5/7, A6/6 and A6/7 (BMNH) (UG, Legon).

Nothing is known of the biology of *latharis* except that it appears to be totally arboreal and is confined to densely forested regions. The nearest relative of *latharis* within the group appears to be *limitis*, from which it is separated by the different development of the margination of the propodeum and other, more minor dissimilarities.

***Polyrhachis lestoni* sp. n.**

(Text-figs 48, 61)

Holotype worker. TL 5·7, HL 1·34, HW 1·11, CI 83, SL 1·40, SI 126, PW 1·11, MTL 1·29. Mandibles with four teeth; anterior margin of clypeus with a projecting, shallow rectangular lobe, the corners of which are minutely dentate and acute. In the centre of the lobe is a small, U-shaped notch. Head broader behind than in front, the sides weakly convex and converging anteriorly. Eyes convex, situated well up on the sides, not breaking the outline of the sides in full-face view. Alitrunk strongly antero-posteriorly compressed, almost as broad as long. Pronotum convex dorsally, armed with a pair of short, broad spines and marginate almost to the promesonotal suture, which is distinct. Mesonotum and propodeum fused, without the metanotal groove, but the limits of the two segments are discernible dorsally due to the direction of the sculpturation, discussed below. The fused mesonotum-propodeum is strongly convex, not marginate. Propodeum unarmed but with a weak transverse ridge separating the dorsum from the declivity, the latter deep and shallowly concave. Scale of petiole large, armed only with a small pair of teeth laterally. In front view the margin of the scale between the teeth is strongly convex and weakly sinuate dorsally. Anterior face of the first gastral segment strongly concave medially.

Dorsum of head and gaster with a few erect, white hairs, absent from the dorsum of the alitrunk and the first gastral tergite. Everywhere a sparse, greyish pubescence present.

Clypeus superficially reticulate, overlaid by extremely fine longitudinal striae. Head longitudinally striate. Pronotum finely striate, much more finely so than the head or the remainder of the alitrunk, the striae overlying a superficial reticulation. Some pronotal striae tend to arch from the spines towards the centre of the sclerite and then outwards again towards the promesonotal junction; the rest are longitudinal. The more coarse striae of the mesonotal region are divergent posteriorly, whilst those of the propodeum converge on a postero-median spot situated close to the weak ridge separating the dorsum from the declivity. Declivity, petiole and gaster finely, superficially reticulate. Sides of pronotum and the pleurae finely reticulate-rugose but the sides of the propodeum sculptured as the dorsum.

Paratype workers as holotype, but in one specimen the dorsal margin of the petiole is somewhat concave medially, giving the appearance of a pair of very broad, blunt, dorsolaterally situated tubercles. The range of dimensions of the paratypes is: TL 5·5–5·7, HL 1·29–1·33, HW 1·11–1·14, CI 84–85, SL 1·37–1·40, SI 123–126, PW 1·12–1·14, MTL 1·26–1·29 (3 measured).

Holotype worker, GHANA : Eastern Region, Mt Atewa, primary forest, by pyrethrum knock-down, sample A5/1, 12.vii.1969 (*D. Leston*) (BMNH).

Paratypes. One worker with same data as holotype (BMNH); one worker with same data but sample A4/4 (UG, Legon); and one worker, GHANA : Eastern Region, Adeiso (*P. M. Room*) (in coll. P. M. Room).

Polyrhachis limitis Santschi **stat. n.**

(Text-fig. 36)

Polyrhachis alexisi st. *limitis* Santschi, 1939 : 12. Holotype worker, CONGO (KINSHASA) : Congo Pale (*Gérard*) (NM, Basle) [examined].

Worker. TL 6·5, HL 1·59, HW 1·29, CI 81, SL 1·63, SI 126, PW 1·33, MTL 1·67.

Anterior clypeal margin produced into a shallow, rectangular lobe medially, the lobe bluntly dentate on each side. Sides of head more or less straight and somewhat convergent in front of the eyes, convex and rounding into the occipital margin behind. Eyes convex, situated well up on the sides but breaking the outline of the sides in full-face view. Alitrunk antero-posteriorly compressed and with a swollen appearance. Pronotum convex, armed with a pair of spines, marginate from the spines to a point about half way between their bases and the promesonotal suture; the latter distinct. Mesonotum not marginate, the dorsum rounding into the sides, separated from the propodeum by a very weakly marked metanotal groove. Propodeum unarmed, weakly marginate laterally and posteriorly, the sides not greatly expanded beyond the lateral marginations in dorsal view. Propodeal declivity deep and shallowly concave. Petiole armed with four spines, the dorsal pair noticeably longer than the laterals but narrower and separated by a distance about twice as great as the length of one spine. Anterior face of the first gastral segment concave medially.

Erect hairs absent from all dorsal surfaces of the head and body except the clypeus and the apex of the gaster. Pubescence very short and sparse, most easily seen on the gaster and the appendages.

Clypeus, declivity of propodeum, petiole and gaster finely reticulate. Dorsal surfaces of head, mesonotum and propodeum longitudinally striate-rugose, the pronotum more irregularly so, tending to a rugoreticulum laterally. Sides of pronotum and the mesopleuron reticulate-rugose, the sides of the propodeum longitudinally striate-rugose.

The species is apparently known only from the type collection. Originally described as a race of *alexisi*, *limitis* is now considered to be a good species and appears to be more closely related to *latharis* than to the species with which it was first associated. The main differences responsible for the decision to raise *limitis* to specific rank were the presence of margination on the propodeum and the differences in sculpturation between it and *alexisi*. In the original description Santschi begins with the symbol for female but later refers to the specimen as a worker, which is the correct caste.

THE *GAMAII*-GROUP

The single species constituting this group is not obviously related to any other species known from the Ethiopian region. It is characterised by the partial margination of the alitrunk, the reticulate-punctate sculpturation and the lack of erect hairs. Besides these characters, the pronotum has only a pair of blunt tubercles, the propodeum has a pair of bluntly tuberculiform teeth, and the mesoscutellum is present upon the dorsum of the alitrunk. The petiole is more or less normal, with a pair of dorsal spines and a lateral pair of teeth.

As Arnold (1924 : 137) pointed out, this species is difficult to place. In the form of the petiole it resembles some members of the *militaris*-group, but in virtually all other ways it is unrelated to that group.

Polyrhachis gamaii Santschi

Polyrhachis gamaii Santschi, 1917 : 295. Holotype ♀, SOUTH AFRICA : Natal, Durban (*H. B. Marley*) (probably in NM, Basle).

Polyrhachis gamaii Santschi; Arnold, 1947 : 136, figs 5a, 5b, worker [examined].

Worker. TL 7·7–8·5, HL 1·81–1·97, HW 1·70–2·08, CI 94–105, SL 1·81–2·08, SI 100–106, PW 1·18–1·48, MTL 2·37–2·59. (6 measured.)

Head truncated in front so that the clypeus is almost vertical, its anterior margin entire. Sides of head convex, the convex eyes situated well up from the ventrolateral margin, not breaking the outline of the sides of the head in full-face view. Pronotum and mesonotum not marginate, the dorsal surfaces rounding into the sides; propodeum marginate laterally. Humeral angles of the pronotum without spines but projecting as bluntly rounded tubercles. Propodeum with a pair of thick, tuberculiform teeth, directed upwards and weakly outwards. Promesonotal suture distinct; the mesoscutellum present on the dorsum, separated from the scutum in front and the propodeum behind by a pair of weakly raised, transverse carinae, best seen in profile. Petiole armed with a dorsal pair of long straight spines whose apices curve slightly inwards in front view, and with a laterally placed pair of acute teeth. The subpetiolar process is developed anteriorly into a dentiform lobe.

Erect hairs present only on the mandibles, clypeus and the apex of the gaster. A fine, sparse pubescence is present on the antennal scapes, the legs, and the first gastral segment in some individuals.

Sculpturation of head varying above the eyes from finely reticulate-punctate to superficially reticulate. The alitrunk dorsally finely reticulate to reticulate-punctate; the sides and the petiole more coarsely so. Declivity of propodeum and gaster very faintly and finely, superficially reticulate. Colouration a variable mixture of black, black-brown, red, and red-brown. Head black with red-brown mandibles, the antennal scapes red-brown or black. Alitrunk varying from red-brown with large infuscated areas to mostly black with weak red-brown or black-brown patches. The sides of the alitrunk usually red-brown but variously infuscated. Petiole and gaster varying from red-brown to black-brown; legs usually red-brown. In general the larger individuals tend to have more black and less red on the alitrunk than do the smaller forms.

In his description of the worker Arnold stated that it was without doubt the worker of *gamaii*, a species previously known only from the queen caste. A comparison of these workers with a female in the BMNH collection suggests that Arnold was correct in assigning them to *gamaii*. In general body form and sculpturation the differences between the female and the workers are only as expected between the two castes, but the female is distinctly more pilose and has the petiolar spines disproportionally spaced in comparison to the worker. Marked similarities include the head shape, development of pronotal tubercles and propodeal teeth, form of petiole, and the presence of a dentiform subpetiolar process.

Nothing is known of the biology of this species, but a lone female without wings was found in South Africa in March.

MATERIAL EXAMINED.

SOUTH AFRICA : Zululand, St Lucia (J. W. G. – in Arnold coll.).

SPECIES EXCLUDED

Polyrhachis bihamata (Drury)

Formica bihamata Drury, 1773 : 73, pl. 38, fig. 7, 8.
Polyrhachis bihamata (Drury) F. Smith, 1857 : 58, fig. 19.

Drury gave the type-locality of this species as the Island of Johanna, near Madagascar. André (1886 : 286) in his key to the then-known species of *Polyrhachis* of the Ethiopian region stated that 'This species, which lives in tropical Asia, Malaysia and the Australian islands has been indicated by Drury as being found on Johanna Island, one of the Comoros, but I doubt this locality.'

Wheeler (1922*a* : 257) pointed out that the genus *Polyrhachis* is absent from Madagascar, and Hung (1970 : 16) excluded the species from the regional fauna, adding that Drury was 'evidently in error'.

Polyrhachis consimilis F. Smith

Polyrhachis consimilis F. Smith, 1858 : 73, pl. 4, figs 30, 31. Holotype worker (BMNH) [examined].

Smith recorded the type-locality of this species as Sierra Leone and noted that it resembled *P. ammon* (F.). Emery (1925 : 185) placed *consimilis* in the subgenus *Hagiomyrma* Wheeler, of which *ammon* is the type-species but noted that the species was dubiously placed in this subgenus and that the type-locality was probably incorrect. The known distribution of the *ammon* species group is the Indo-Australian region, and as no further specimens of this species or of this species-group have been collected in Africa it is now probably safe to assume that Smith was in error when he assigned *consimilis* to Sierra Leone.

Polyrhachis setulosus 'Smith'

Polyrhachis setulosus Smith; Radoszkovsky, 1881 : 197.

Radoszkovsky recorded this species from Angola and credited the name to Smith. Wheeler (1922*b* : 992, footnote) noted that he could not find a description of this species. A search through the literature, particularly of F. Smith, by the present author has also failed to reveal any description of *setulosus*, which is thus assumed to be a *nomen nudum*.

Phasmomyrmex paradoxa (E. André)

Polyrhachis paradoxa E. André, 1892 : 46. Holotype worker, GABON.
Phasmomyrmex paradoxa (E. André) Emery, 1925 : 58.
Camponotus polyrhachioides Emery, 1897 : 227, fig. 11a, worker.

Ph. paradoxa is superficially similar to the 'normal' *Polyrhachis* species of the Ethiopian region as the pronotum is armed with a pair of broad, flattened teeth,

the pronotum and mesonotum are bluntly marginate and the petiole bears a pair of short but acute spines. However, the mesoscutellum is present on the dorsum of the alitrunk and is fused to the propodeum; separating them from the mesoscutum is a broad, deep impression. The propodeum in profile is blocky, unarmed and strongly sloping backwards, the declivity is strongly concave. In dorsal view the pronotum is more than twice as wide as the propodeum, and the fine reticulate-punctate sculpturation of the former contrasts strongly to the sparse, coarse rugulation of the latter segment.

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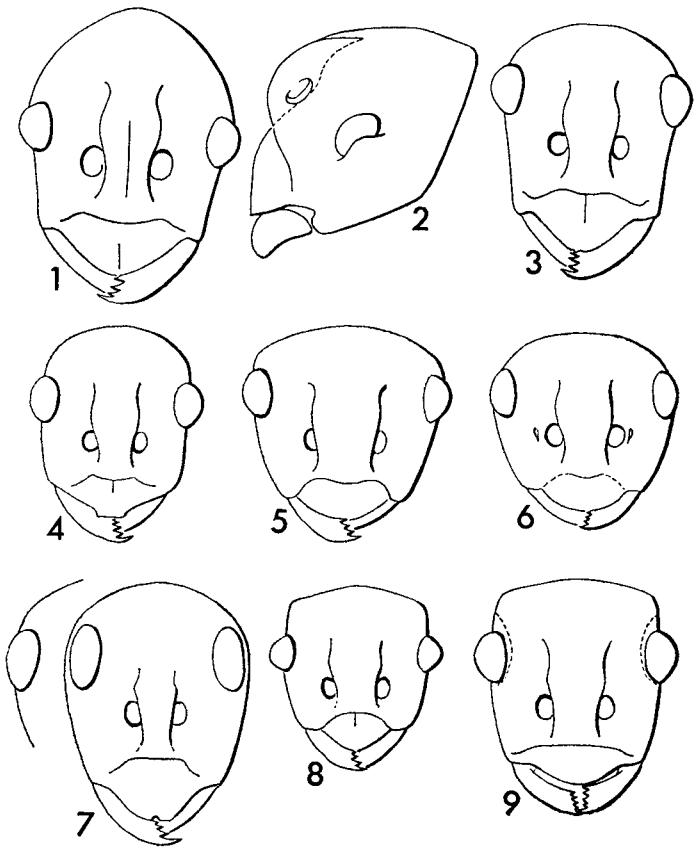
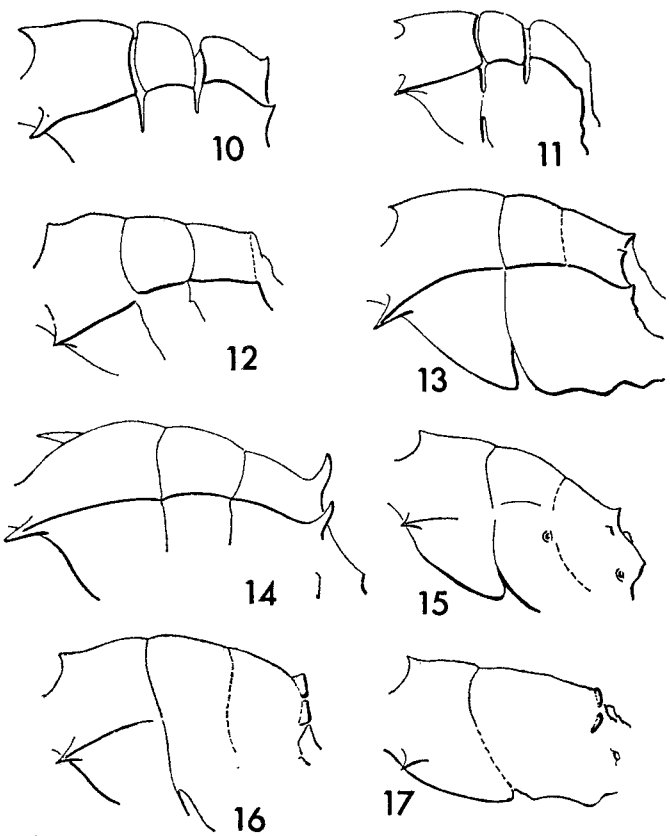
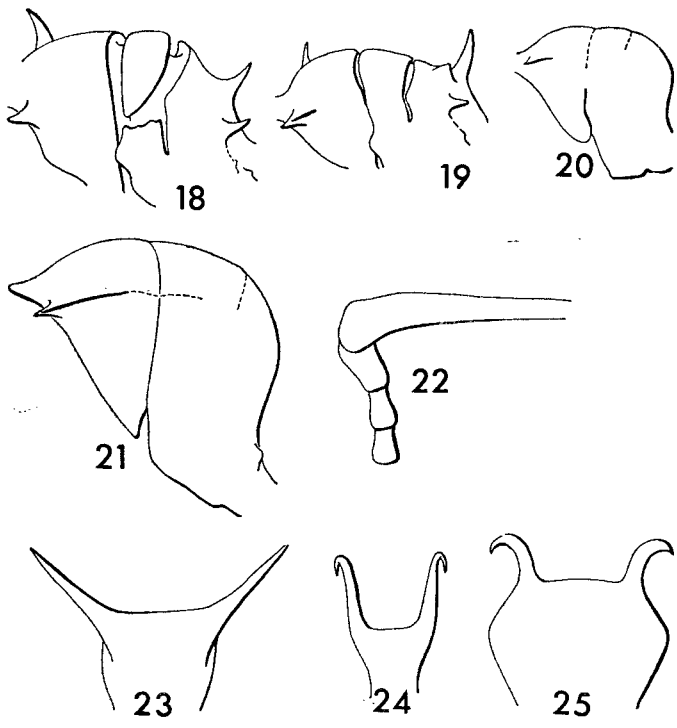


TEXT-FIGS 1–9. Head shape in *Polyrhachis* workers, antennae omitted. 1 *concava*, 2 the same in profile to show the ventral masking of the eye at its greatest extent. 3 *alluaudi*, 4 *volkarti*, 5 *fissa*, 6 *lauta*, 7 *viscosa*, offset shows eye at maximum convexity. 8 *phidias*, 9 *cornuta*.



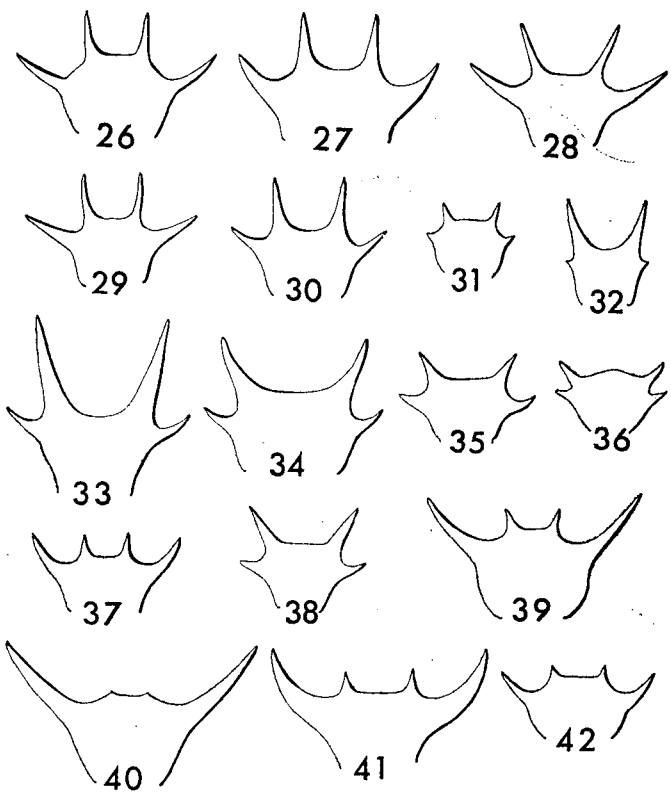
TEXT-FIGS 10–17. Alitrunks of *Polyrhachis* workers. 10 *alluaudi*, 11 *rufipalpis*, 12 *durbanensis*, 13 *viscosa*, 14 *nigrita*, 15 *aenescens*, 16 *otleti*, 17 *volkarti*.



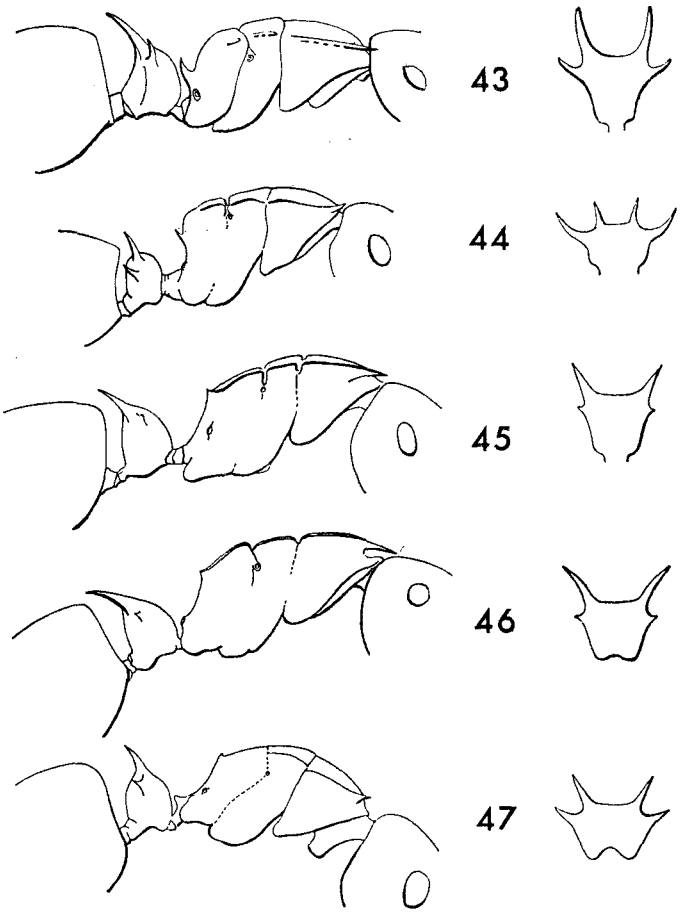
TEXT-FIGS 18–21. Alitrunks of *Polyrhachis* workers. 18 *monista*, 19 *spitteleri*, 20 *alexisi*, 21 *curta*.

TEXT-FIG. 22. Apex of antennal scape and first three funicular segments of *P. viscosa*.

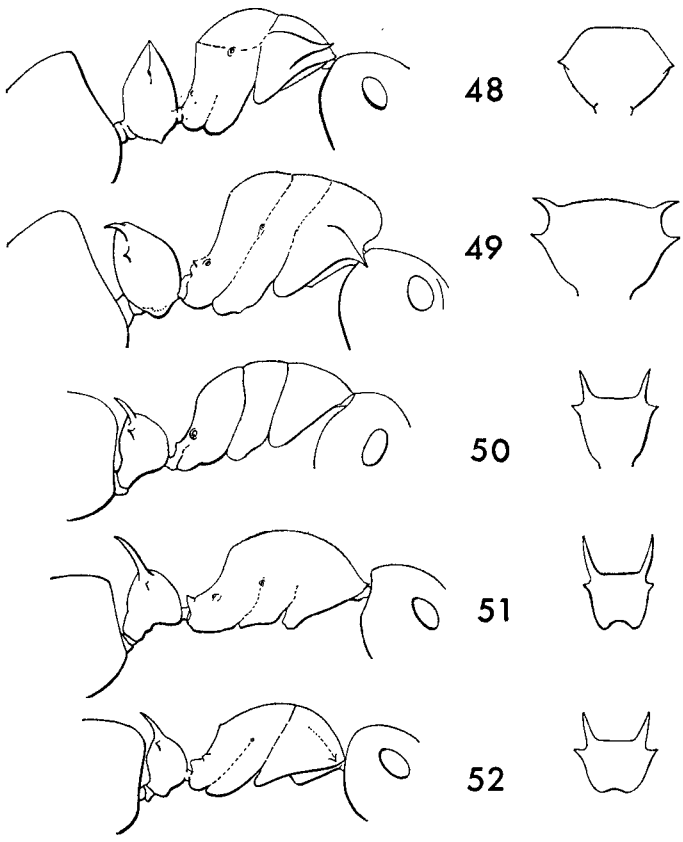
TEXT-FIGS 23–25. Anterior view of petiole of *Polyrhachis* workers. 23 *wellmani*, 24 *laboriosa*, 25 *curta*.



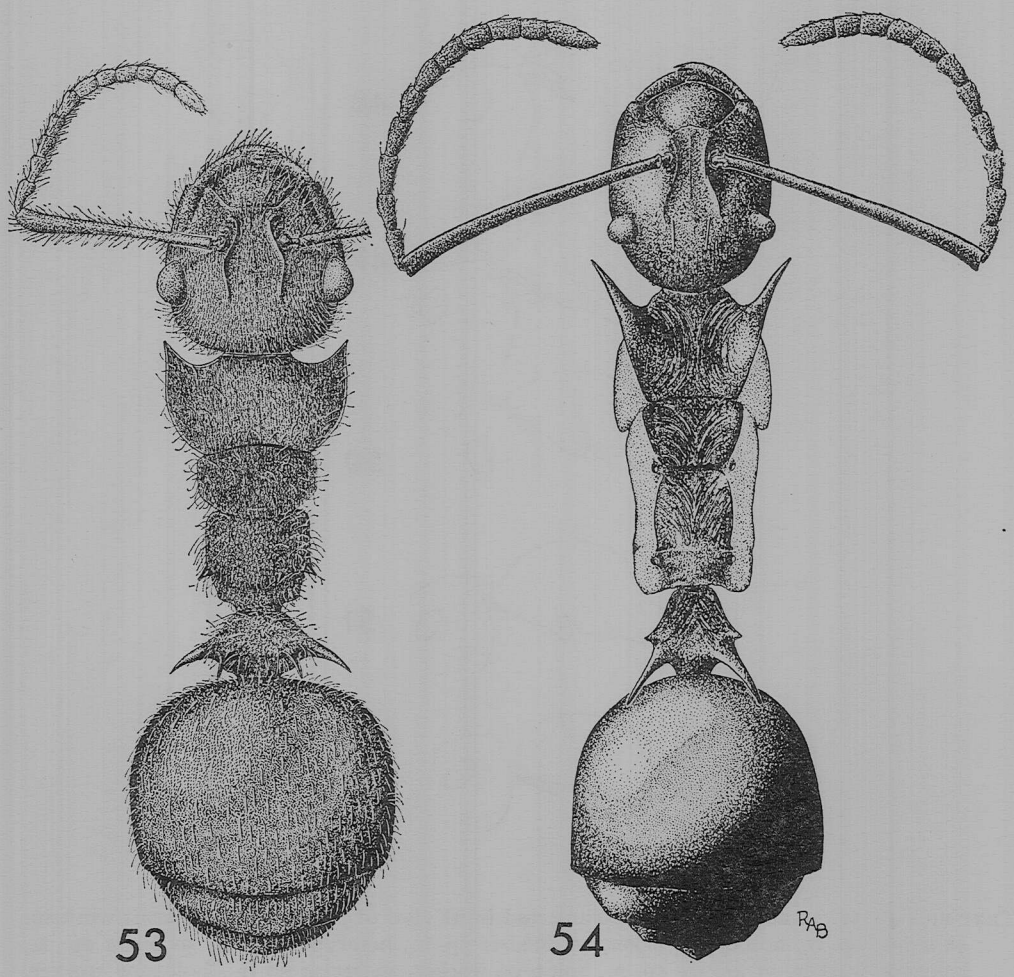
TEXT-FIGS 26–42. Anterior view of petiole of *Polyrhachis* workers. 26 *fissa*, 27 *arnoldi*, 28 *monista*, 29 *spitteleri*, 30 *durbanensis*, 31 *alexisi*, 32 *aenescens*, 33 *concava*, 34 *otleti*, 35 *rufipalpis*, 36 *limitis*, 37 *lauta*, 38 *alluaudi*, 39 *viscosa*, 40 *nigrita*, 41 *cornuta*, 42 *phidias*.



TEXT-FIGS 43–47. Lateral view of alitrunk and front view of petiole of *Polyrhachis* workers. 43 *sulcata*, 44 *asomaningi* sp. n., holotype worker, 45 *esarata* sp. n., holotype worker, 46 *decellei* sp. n., holotype worker, 47 *transiens* sp. n., holotype worker.

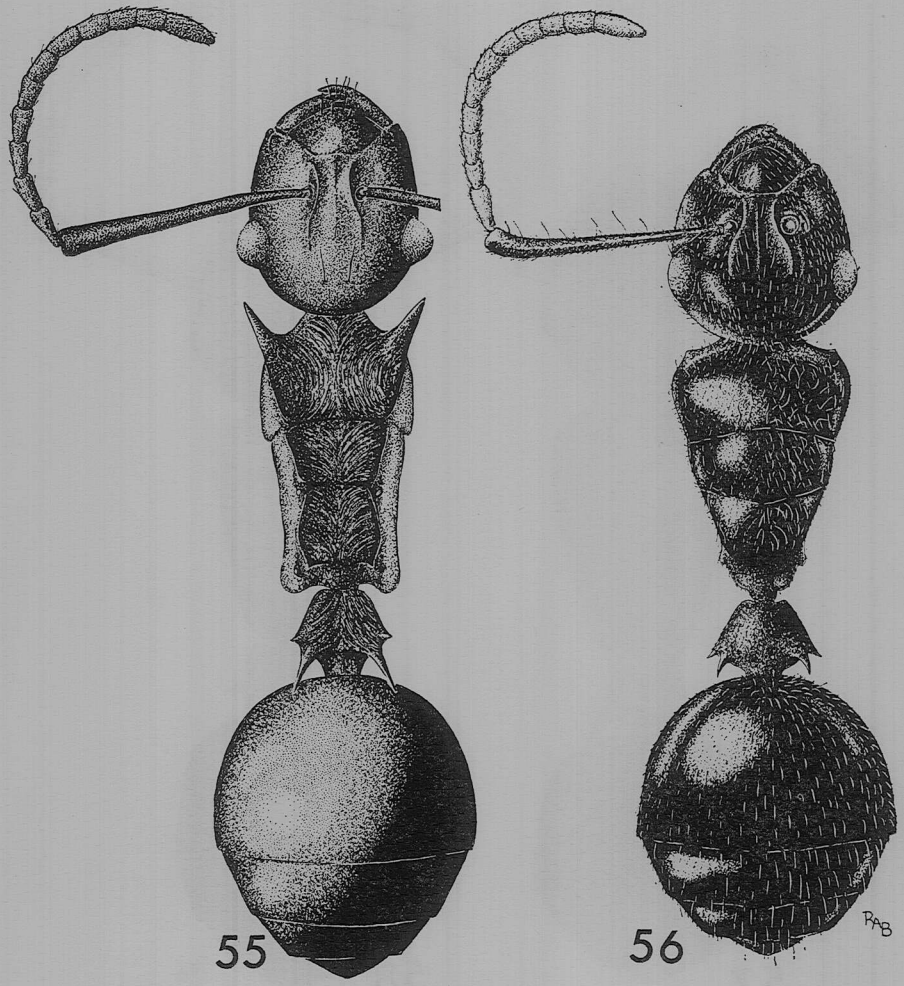


TEXT-FIGS 48–52. Lateral view of alitrunk and front view of petiole of *Polyrhachis* workers. 48 *lestoni* sp. n., holotype worker, 49 *latharis* sp. n., holotype worker, 50 *braxa* sp. n., holotype worker, 51 *khepra* sp. n., holotype worker, 52 *regesa* sp. n., holotype worker.



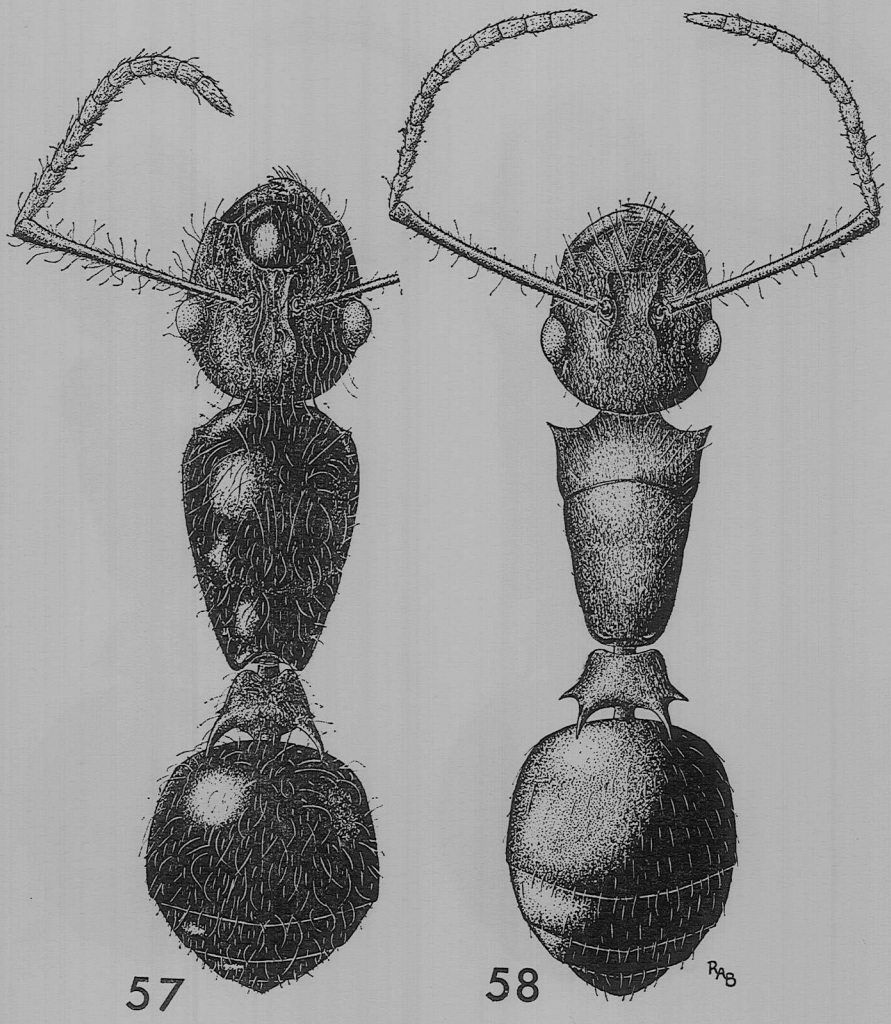
TEXT-FIG. 53. *Polyrhachis asomaningi* sp. n., dorsal view of holotype worker, legs omitted.

TEXT-FIG. 54. *Polyrhachis decellei* sp. n., dorsal view of holotype worker, legs omitted.



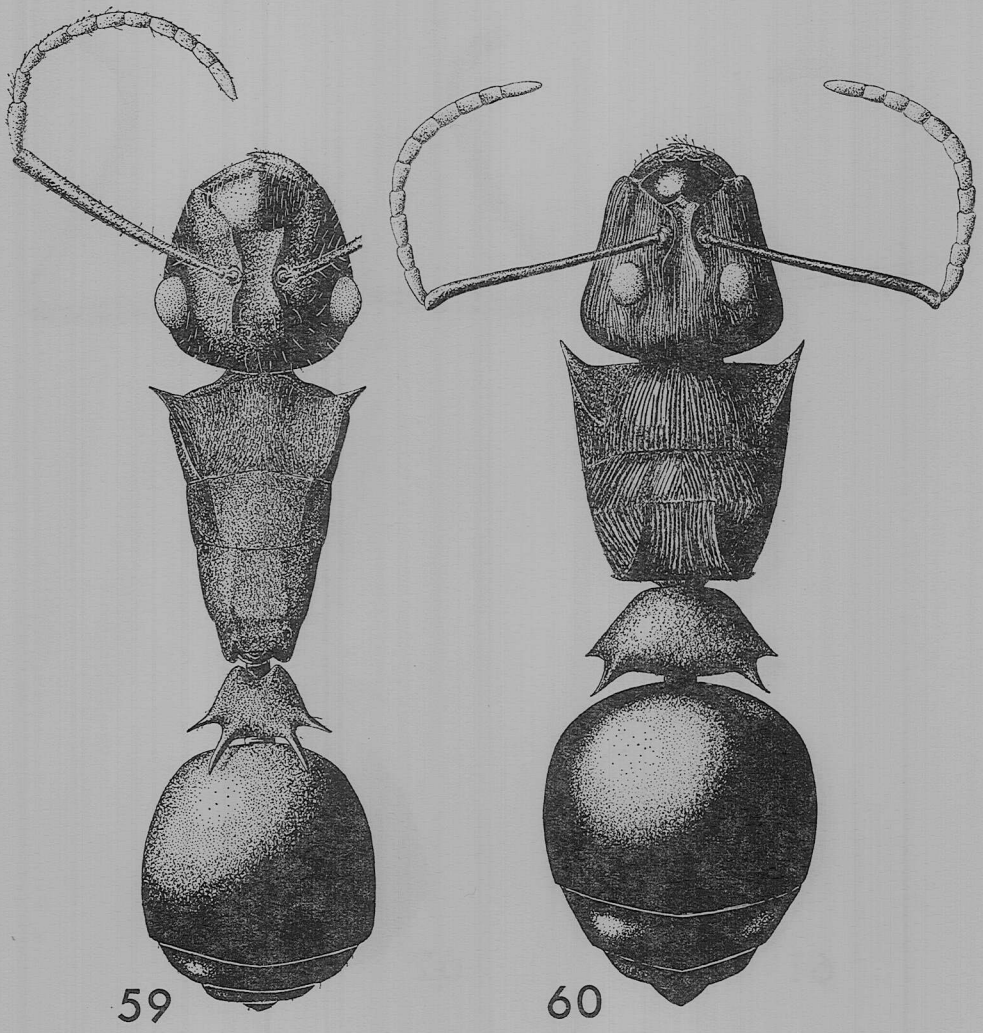
TEXT-FIG. 55. *Polyrhachis esarata* sp. n., dorsal view of holotype worker, legs omitted.

TEXT-FIG. 56. *Polyrhachis braxa* sp. n., dorsal view of holotype worker, legs and right antenna omitted.



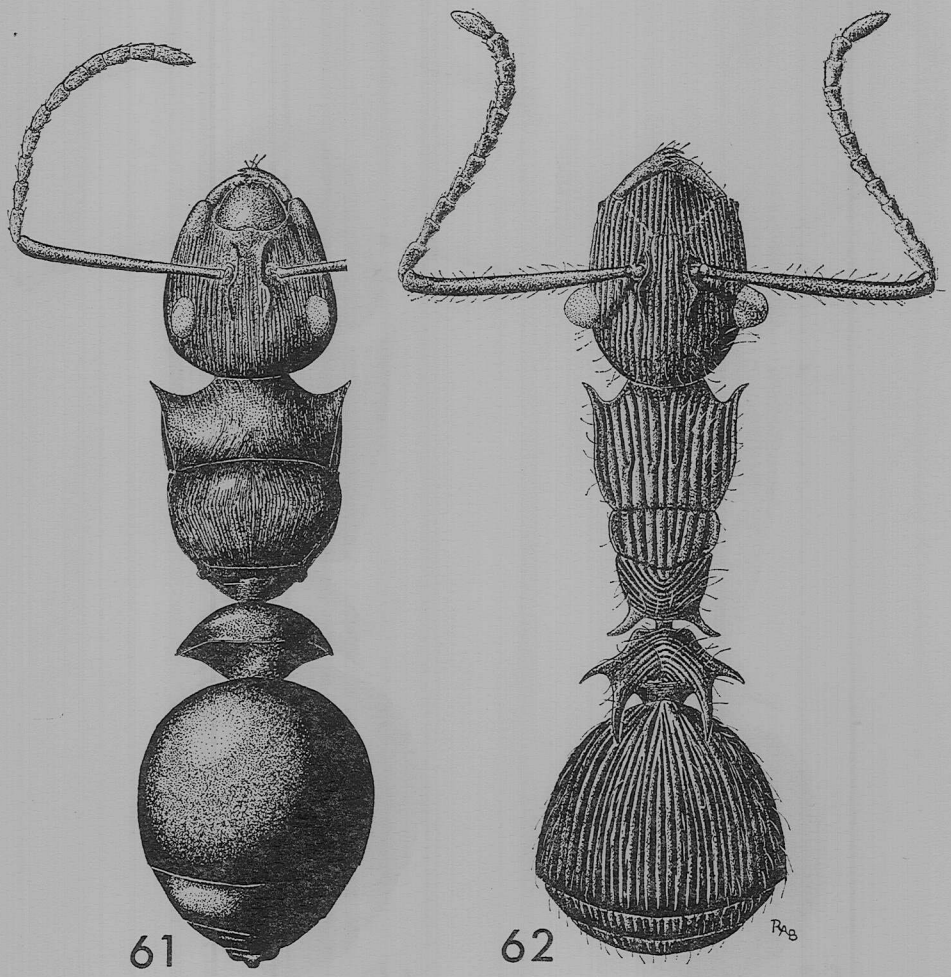
TEXT-FIG. 57. *Polyrhachis khepra* sp. n., dorsal view of holotype worker, legs omitted.

TEXT-FIG. 58. *Polyrhachis regesa* sp. n., dorsal view of holotype worker, legs omitted.



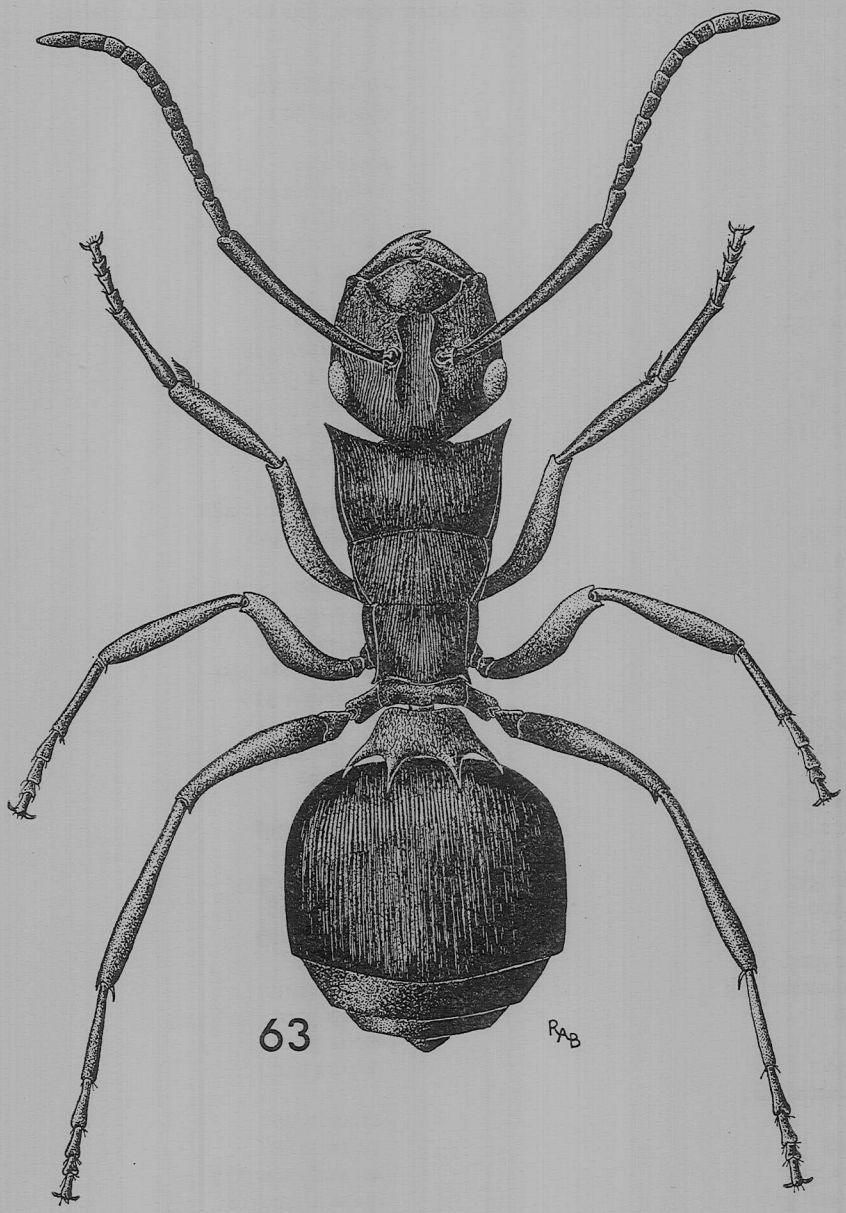
TEXT-FIG. 59. *Polyrhachis transiens* sp. n., dorsal view of holotype worker, legs omitted.

TEXT-FIG. 60. *Polyrhachis latharis* sp. n., dorsal view of holotype worker, legs omitted.



TEXT-FIG. 61. *Polyrhachis lestoni* sp. n., dorsal view of holotype worker, legs omitted.

TEXT-FIG. 62. *Polyrhachis sulcata*, dorsal view of worker, legs omitted.



TEXT-FIG. 63. *Polyrhachis arnoldi*, dorsal view of worker.

The names are listed below in alphabetical order; synonyms are printed in *italics*.

acheron 305
aenescens 332
aerope 296
alexisi 346
alluaudi 297
andrei 298
anteplana 297
antinorii 330
architecta 308
argentatus 313
arnoldi 324
asomaningi 298
atalanta 309
atrociliata 318

balli 342
benguelensis 318
bequaerti 304
bihamata 352
braxa 333
bruta 313

cafrorum 318
calabarica 313
carinatus 318
clariseta 305
concava 299
conduensis 342
congolensis 305
conradti 335
consimilis 352
cornuta 300
crassa 342
cubaensis 325
cupreopubescens 313
curta 346

decellei 301
decemdentata 302
dido 313
divina 318
divinoides 318
donisthorpei 338
durbanensis 327

epinotalis 313
esarata 303

felici 335
fernandensis 302
fissa 304
flavipes 302
fracta 318

gagates 305
gagatoides 318
gallicola 329
gamaii 351
gerstaeckeri 325
gustavi 302

Hoplomyrmus 288
hortulana 308

imatongica 330
indefinita 305
indigens 321
iperpunctata 310
iperstriata 310

khepra 334
kohli 341

laboriosa 308
laeta 311
lanuginosa 335
latharis 348
latispina 309
lauta 311
lestoni 349
limitis 350
localis 311
lyrifera 346

maynei 346
Myrma 288
mayumbensis 317
mediopilosa 318
medusa 312

militaris 313
monista 343

natalensis 338
nigriseta 305
nigrita 328
nkomoensis 313

obsidiana 305
otleti 336

paradoxa 352
phaenogaster 342
phidias 316
platyomma 337
plebeia 321
pleurata 313
polyrhachioides 352
Pseudocrytomyrma 288, 289, 332

regesa 337
revoili 338
rufipalpis 317
rugulosa 318

sankisiana 313
santschii 335
schistacea 318
schlueteri 321
schoutedeni 328
setulosus 352
spinicola 329
spitteleri 344
spretula 330
ssibangensis 313
striativentris 313
striolatorugosa 325
subplana 318
sulcata 322

tenuistriata 302
transiens 340
transversaria 313

ugandensis 304

viscosa 330
volkarti 341

weissi 342
wellmani 323
wilmsi 325

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